PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04M 7/00, H04Q 11/04 — A1

(11) International Publication Number: WO 00/42760

(43) International Publication Date: 20 July 2000 (20.07.00)

(21) International Application Number: PCT/SE99/02490

(22) International Filing Date: 28 December 1999 (28.12.99)

(30) Priority Data:

60/116,198	15 January 1999 (15.01.99)	US
09/472,410	27 December 1999 (27.12.99)	US

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors: GLITHO, Roch; 4530 Beaconsfield, Montreal, Quebec H4A 2H7 (CA). GOURRAUD, Christophe; 5470 rue Duquette, Montreal, Quebec H4A 1J6 (CA).

(74) Agent: NORIN, Klas; Ericsson Radio Systems AB, Common Patent Dept., S-164 80 Stockholm (SE).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

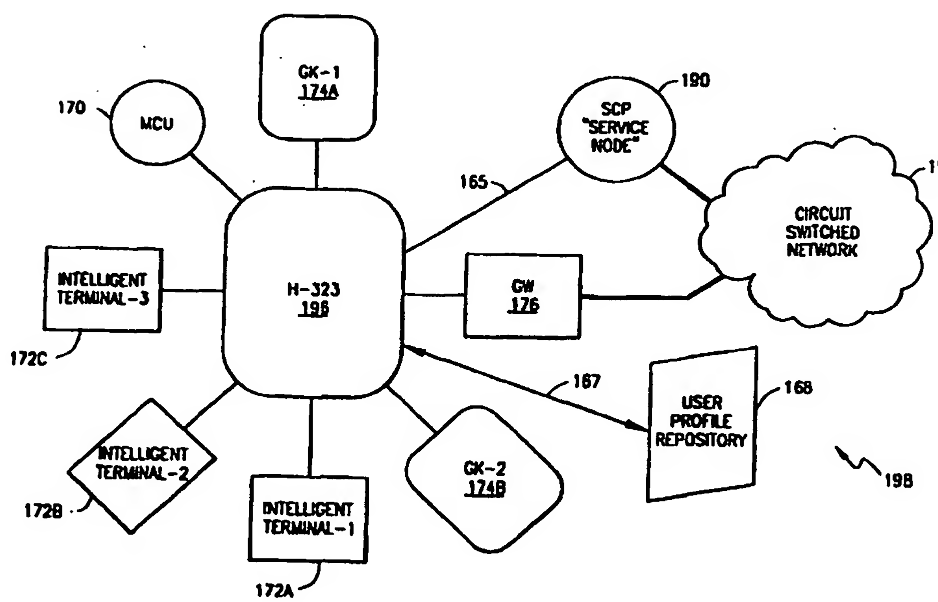
Published

With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: SYSTEM AND METHOD FOR PROVIDING ACCESS TO SERVICE NODES FROM ENTITIES DISPOSED IN AN INTEGRATED TELECOMMUNICATIONS NETWORK

(57) Abstract

A system and method of accessing services from end terminals disposed in an integrated telecommunications network having a packet-switched network (PSN) portion such as for example, a network portion using the Internet Protocol (IP) and a circuit-switched network (CSN) portion such as, for example, a wireless telephony network portion. The PSN portion is preferably realized as a Voice-over-IP (VoIP) network having a gateway connected to the CSN portion. A service or application node, preferably a WIN/IN-based service node comprising a Service Control Point (SCP), a Service Data Point (SDP), or both, is provided with an interface operable with the PSN portion. A call control state machine associated with the end terminals is modified to include WIN/IN-compliant DPS. A user profile retriever provided in the network also. When the call control process of the end terminal encounters an armed DP, it creates a Service Access instance as part of a service access server and passes control thereto, wherein a service proxy sends a request to a service logic environment, preferably provided as the WIN/IN service node. Upon executing an appropriate service logic portion or portions, the service node returns a result to the service access server which, in turn, passes it to the call control process.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

SYSTEM AND METHOD FOR PROVIDING ACCESS TO SERVICE NODES FROM ENTITIES DISPOSED IN AN INTEGRATED TELECOMMUNICATIONS NETWORK

PRIORITY STATEMENT UNDER 35 U.S.C §119(e) & 37 C.F.R. §1.78

This nonprovisional application claims priority based upon the following prior U.S. provisional patent application entitled: "Enhancing Supplementary Services through the Use of Intelligent Network Principles and Accessing Service Nodes from End Terminals," Ser. No. 60/116,198 (prior Attorney Docket Number 27950-296L, current Attorney Docket Number 1000-0142), filed January 15, 1999, in the names of: Roch Glitho and Christophe Gourraud.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application discloses subject matter related to the subject matter disclosed in the following co-assigned patent application: "System and Method for Providing Supplementary Services (SS) in an Integrated Telecommunications Network," filed December 10, 1999, Ser. No. _________ (Attorney Docket Number 1000-0142), in the names of: Roch Glitho and Christophe Gourraud.

BACKGROUND OF THE INVENTION

Technical Field of the Invention

The present invention relates to integrated telecommunication systems and, more particularly, to a system and method for providing access to service nodes from entities (e.g., endpoints, terminals, gatekeepers, etc.) disposed in an integrated telecommunications network. The exemplary integrated telecommunications network may comprise a packet-switched network (PSN) coupled to a circuit-switched network (CSN). Also, the network may comprise a PSN portion only.

Description of Related Art

Coupled with the phenomenal growth in popularity of the Internet, there has been a tremendous interest in using packet-switched network (PSN) infrastructures (e.g., those based on Internet Protocol (IP.) addressing) as a replacement for, or as an adjunct to, the existing circuit-switched network (CSN) infrastructures used in today's telephony. From the network operators' perspective, the inherent traffic aggregation in packet-switched infrastructures allows for a reduction in the cost of transmission and the infrastructure cost per end-user. Ultimately, such cost reductions enable the network operators to pass on the concomitant cost savings to the end-users.

Some of the market drivers that impel the existing Voice-over-IP (VoIP) technology are: improvements in the quality of IP telephony; the Internet phenomenon; emergence of standards; cost-effective price-points for advanced services via media-rich call management, et cetera. Some of the emerging standards in this area are the well-known H.323 protocol, developed by the International Telecommunications Union (ITU), Session Initiation Protocol (SIP) or Internet Protocol Device Control (IPDC) by the Internet Engineering Task Force (IETF), or Simple/Media Gateway Control Protocol (SGCP or MGCP). Using these IP standards, devices such as personal computers can inter-operate seamlessly in a vast inter-network, sharing a mixture of audio, video, and data across all forms of packet-based networks which may interface with circuit-switched network portions.

As is well-known in the telecommunications industry, services and service provisioning are the *raison d'être* of a telecommunications network, including VoIP networks. Services are typically categorized into (i) "basic services" (i.e., services which allow basic call processes such as call establishment and termination) or (ii) "advanced services" which are also commonly referred to as Value-Added Services (VAS). It is also well-known that advanced services operate as factors for market differentiation and are crucial for network operators' (or service providers') success.

Because of the integration of PSNs and CSNs, two approaches are available for providing Value-Added Services (also known in H.323-based VoIP networks as

Supplementary Services) in VoIP networks. The IP-based VAS architecture is based on the notion that because telephony call control logically resides within the end terminals of the network, service implementation should preferably be localized therein also. This architecture makes terminals the primary actors for IP VAS. On the other hand, there exists an Intelligent Network (IN) or Wireless Intelligent Network (WIN) service architecture for providing VAS in the context of CSNs. The WIN/IN service architecture is network-centric, that is, service implementation is done in the network, with centralized service logic in a service node (e.g., a Service Control Point or SCP) that is accessed by switching entities. Applied to IP telephony, this implies access from such entities as gatekeepers (in H.323 networks) or proxy/redirect servers (in SIP networks).

It should be apparent to those skilled in the art that each of the VAS approaches set forth above has its own shortcomings and deficiencies. For instance, in IP-based VAS architectures, a significant concern is that the architecture does not address service mobility (i.e., end-user can access the services regardless of the terminal/appliance used). Also, typically a small number of services are provided in these approaches, which tend to be rather simple as well. Further, as the number of services available increases, the issue of service interaction becomes more significant because there is no centralized logic for resolving contentions or conflicts among the services.

In the case of WIN/IN service architectures, a principal drawback is the complexity of the CSN itself. Also, another significant shortcoming is that network-based service architectures do not scale reliably as the number of available services keeps increasing.

As is well known, there have been several VAS solutions, depending upon the particular standard used in IP telephony. For example, the H.323 standard comes equipped with the H.450 protocol for Supplementary Services (SS). Similarly, there are solutions such as Call Processing Language (CPL) for the SIP-based IP telephony. Also, there exist Application Programming Interface (API)-based solutions such as, e.g., Parlay, VHE/OSA, etc.

However, it should be appreciated by those of ordinary skill in the art that several shortcomings and weaknesses exist in the state-of-the-art service provisioning schemes in

VoIP networks, regardless of whether they are H.323-based, SIP-based, or otherwise. For example, none of the solutions is complete or fully satisfactory per se. Service invocation is usually not addressed in these solutions. If addressed at all, service invocation capabilities are rather limited and poorly provided. Further, each solution is a "closed" entity in that it does not permit the integration of other solutions, either existing or yet to come.

Based on the foregoing, it is apparent that there has arisen an acute need for a service provisioning architecture for use within the context of the burgeoning VoIP technology which overcomes these and other shortcomings and deficiencies of the current IP- and WIN/IN-based service architectures. The present invention provides such a solution.

SUMMARY OF THE INVENTION

Accordingly, the present invention advantageously provides a generalized service invocation and realization architecture for use with an integrated telecommunications network preferably comprising a PSN portion that is operable with any known IP standard. The service invocation and realization architecture includes one or several IP telephony call control modules which integrate the IN-derived Detection Points (DPs) and implement an API which allows services to influence ongoing calls. The call control modules may be implemented in terminals, H.323 gatekeepers, SIP entities, in Media Gateway Controllers (MGCs), or any node in the network that is capable of effectuating call control. A Service Access component or instance -- responsible for evaluating service requests and for creating appropriate service proxies when a new DP is encountered in call control -- is provided. Thus, one or several specialized service proxies which actually invoke services on behalf of the Service Access component and mediate between the services and the call control, if necessary, are also included in the service architecture of the present invention. In addition, services -- which may be implemented using several technologies, e.g., IN/AIN/WIN/CAMEL Service Control Points, non-IN-related application servers (e.g., Parlay application server), call control-resident services (e.g., Java executables), service

scripts (e.g., SIP CPL, SIP CGI, etc.), or mobile agents -- are implemented as within a universally accessible Service Logic Environment or Environments.

Further, the service proxies and the Service Access component operate in concert as a Service Access server to provide access to local services, mobile agent services, or remote service nodes in an appropriate Service Logic Environment. A user profile used by the various components to invoke the right services at the right time is included in the service architecture. This user profile may partly be co-resident with the call control module, or reside at a remote location that is retrievable. In addition, the profile may preferably be modifiable by various applications, including services implemented as mobile agents.

In one aspect, the present invention is directed to method of accessing a service node, preferably, e.g., a Wireless Intelligent Network (WIN) node, from an end terminal disposed in an integrated telecommunications network having a Voice-over-Internet Protocol (VoIP)-based PSN portion and a cellular network portion. An interface module is disposed between the service node and the PSN-VoIP portion. The method incorporates one or more detection points (DPs) in a call control process provided with the end terminal. The DPs are preferably WIN-compliant, and operate to pass control to a Service Access instance of the Service Access server when the call control process encounters an armed DP of appropriate type. Thereafter, the Service Access server determines if one or more services need to be executed. If so, a service request is sent from a service proxy of the Service Access server to the service node for service execution. Responsive to the service request, a result is received in the Service Access server from the service node. Subsequently, the result is forwarded from the Service Access server to the call control process of the end terminal.

In another aspect, the present invention is directed to a service provisioning method for invoking a WIN service by an end terminal disposed in an integrated telecommunications network having a PSN-VoIP portion and a cellular network portion. The method commences by first effectuating a call control process in the end terminal. A determination is made in the end terminal if an armed DP associated with a service request is encountered by the call control process. The call control process then creates a suitable Service Access

instance which evaluates the service request and creates a service proxy accordingly. Thereafter, a service node disposed in the cellular network is accessed by the service proxy. Subsequently, a service logic portion in the service node is executed to obtain a result which is provided to the call control process in the end terminal.

In yet another aspect, the present invention is directed to an integrated telecommunications network wherein IP entities (e.g., end terminals) are capable of accessing service nodes disposed therein. The integrated telecommunications network includes a PSN portion provided as a VoIP network with one or more end terminals, a circuit-switched network (CSN) portion coupled to the PSN portion via a gateway, and a service node disposed in the CSN portion. The service node includes service logic portions for executing one or more services and is coupled to the PSN portion via an interface. A user profile repository, accessed via a user profile retriever, is disposed in the PSN portion, which includes a list of triggers for a particular end-terminal-and-subscriber combination. A call controller is provided in the end terminal for controlling a call process. Also included is a Service Access server that provides access to a service node over a suitable interface using a service proxy. When an armed DP is encountered in the call process, the call controller creates a Service Access instance as part of the Service Access server and passes control thereto depending on the DP's type. After evaluating the service request or requests, an appropriate proxy is created which engages in appropriate messaging with the service node for executing a service logic portion thereof.

In yet further embodiments, the above-mentioned aspects of the present invention may be practiced with non-IN/WIN services also.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention may be had by reference to the following Detailed Description when taken in conjunction with the accompanying drawings wherein:

FIG. 1A depicts a generalized integrated telecommunications network wherein one or more CSN portions are coupled to an IP-based PSN;

FIG. 1B depicts a functional block diagram of an exemplary embodiment of an integrated telecommunications network having an H.323-based network portion and a cellular network portion, wherein the teachings of the present invention are advantageously employed;

FIG. 1C depicts a functional block diagram indicating signal flow paths of a presently preferred exemplary embodiment of a service provisioning architecture in an integrated telecommunications network with an H.323-based VoIP portion;

FIG. 2A depicts a high-level functional model of a service provisioning scheme for use in an integrated telecommunications network;

FIG. 2B depicts a functional block diagram of a VAS-enabled terminal which can interact with a user profile retriever in accordance with the teachings of the present invention;

FIG. 2C depicts a flow chart of an exemplary embodiment of a service provisioning method for use in an integrated telecommunications network;

FIG. 2D depicts a generalized user profile model for use with a service invocation and realization architecture provided in accordance with the teachings of the present invention;

FIG. 3 depicts a functional block diagram of a VAS architecture provided in accordance with the teachings of the present invention;

FIG. 4 depicts a WIN-compliant Originating Call Control State Machine (O_CCSM) for use with an H.323 terminal or a SIP terminal;

FIG. 5A depicts a WIN-compliant Terminating Call Control State Machine (T_CCSM) for use with an H.323 terminal;

FIG. 5B depicts a WIN-compliant Terminating Call Control State Machine (T_CCSM) for use with a SIP terminal;

FIGS. 6A and 6B depict message flow diagrams for two exemplary embodiments of a call diversion service, respectively, in accordance with the teachings of the present invention;

FIG. 7 depicts a message flow diagram for a hunt group service in accordance with

the teachings of the present invention; and

FIGS. 8A - 8F depict examples of service invocation and realization in accordance with the teachings of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

In the drawings, like or similar elements are designated with identical reference numerals throughout the several views, and the various elements depicted are not necessarily drawn to scale. Referring now to FIG. 1A, depicted therein is a generalized integrated telecommunications network 100 wherein one or more heterogeneous CSN portions are coupled to an IP telephony network 118 (such as, e.g., one based on H.323, SIP, and the like) having Value-Added Services in accordance with the teachings of the present invention. Each of the CSN portions is provided with a suitable gateway for coupling to the IP telephony network portion. For example, a Time Division Multiple Access (TDMA) cellular network portion 102 is coupled to the IP telephony network portion 118 via gateway (GW) 114. In a similar manner, GW 116 is provided between the Plain Old Telephone System (POTS) network portion 106 and the IP telephony network portion.

Each of the CSN portions may be provided with its own service architecture for the provisioning of advanced services. For example, the TDMA network portion 102, which includes one or more mobile terminals, e.g., T 124, may be provided with WIN service architecture. One or more IP terminals or appliances, e.g., T 132A through T 132D, are disposed directly on the IP telephony network portion 118. Furthermore, although not shown in FIG. 1, other entities may be provided as part of the IP telephony network portion 118 depending upon the specific implementation, for example, gatekeepers and Multipoint Control Units (MCUs) (in the case of H.323 implementation), or proxy servers, redirect servers, registrars and so on (in the case of SIP implementation). Also, one or more legacy telephones or appliances (e.g., T 120) are coupled to the IP telephony network portion 118 via an IP adapter or "gateway" (e.g., gw 122).

FIG. 1B depicts a functional block diagram of an exemplary telecommunications network 198 with the H.323 implementation. A GW 176 is disposed between an H.323

IP network portion 196 and a circuit-switched cellular network portion 194 of the telecommunications network 198. One or more service nodes including at least a Service Control Point (SCP), for example, SCP service node 190, optimized for providing advanced services in the framework of WIN/IN architecture, is provided as part of the infrastructure of the circuit-switched cellular network portion 194. Furthermore, in accordance with the teachings of the present invention, a service node converter interface (I/F) may be provided between the H.323 network portion 196 and the SCP service node 190 such that an H.323 entity, e.g., a gatekeeper or a terminal, can interrogate the service node 190 for invoking a subscriber service. Preferably, the converter (not shown in this FIG.) is associated with a communication path 165, using SS7 or IP, between the H.323 portion 196 and the service node 190. A plurality of "intelligent" H.323 terminals (i.e., "service-active" or "service-capable" terminals), e.g., terminal-1 172A (TA) through terminal-3 172C (TC), one or more gatekeepers (GKs), e.g., GK-1 174A and GK-2 174B, and an MCU 170 are disposed in the H.323 network portion 196 in a conventional manner.

In accordance with the teachings of the present invention, a user profile repository 168 is provided as part of the telecommunications network 198 for generating triggers to the service node 190. The user profile repository 168 is interfaced within the H.323 network portion via a suitable interface 167 such as a HyperText Transfer Protocol (HTTP) interface or Lightweight Directory Access Protocol (LDAP) interface. A user profile retriever (not explicitly depicted in this FIG.) is included for retrieving user profile information to be provided to various call/service components, as will be discussed in greater detail hereinbelow.

Whether a trigger should be generated to the service node 190 depends on the VAS activated in the network 198, in addition to whether the end-user has an active subscription to it. In order to determine when to suspend and generate triggers, a call control entity (shown in FIG. 2B hereinbelow) is provided with the capability to interface/interact with the user profile retriever to obtain a set of triggers (i.e., end-user profile) associated with the end-user. However, it should be appreciated that some

constant services, not subject to explicit subscription, or for performance reasons, may give rise to some service triggers being stored locally (that is, within an H.323 entity such as a terminal, gatekeeper, or a media gateway controller (MGC)). Further, while the user profile repository 168 is shown in this exemplary embodiment as a separate entity, it should be understood that the repository may be co-located with an IP mobility management entity or the service node 190 itself.

In the presently preferred exemplary embodiment of the present invention, the service node 190 may be accessed by a host of H.323 entities such as the terminals, gatekeepers, media gateway controllers, etc. For example, FIG. 1C depicts a functional block diagram with signal flow paths for effectuating service node access in an exemplary embodiment of an H.323 VoIP network wherein an IP terminal is provided with the capability of accessing a service node, e.g., SCP service node 190. Those of ordinary skill in the art should readily appreciate that the signal flow diagram shown in FIG. 1C is an abstraction of the network 198 shown in FIG. 1B, having only relevant entities shown therein. For example, the terminal-1 172A and terminal-2 172B are provided with the signal paths 173A and 173B, respectively, for interfacing with the user profile repository 168. Also, signal paths 187A and 187B are provided between the service node converter interface 188 and the two terminals, respectively, for accessing the SCP service node 190. As can be readily seen, GK-1 174A is not provided with a signal path to the user profile repository 168 in this exemplary embodiment. However, it should be understood by those skilled in the art that in some implementations, a gatekeeper and/or other IP entities, for example, an MGC, may also be provided with respective signal paths to either the user profile repository 168, service node converter interface 188, or both. Furthermore, a provision may be made for service triggering over a radio interface (e.g., a General Packet Radio System (GPRS) interface).

The advantageous feature of providing access to service nodes from several types of IP entities is enabled by providing a common framework for call control, service access, and signaling with respect to such entities. FIG. 2A depicts a high-level functional model which illustrates the relationship between call/connection control and VAS in accordance

with the teachings of the present invention. It should be realized that this functional model is independent of the particular standard used for IP telephony and, accordingly, provides a universal service invocation and realization architecture for implementing VAS in IP telephony networks. Essentially, the service invocation and realization architecture is comprised of the following:

– One or several IP telephony call control modules (e.g., module 202), which integrate the IN-derived Detection Points (DPs) and implement an API which allows services to influence ongoing calls. The call control modules may be implemented in terminals, H.323 gatekeepers, SIP proxies, in MGCs, or any node in the network that is capable of effectuating call control.
– A Service Access module (e.g., Service Access server 204) responsible for the invocation of VAS, whose functionality is preferably distributed between a Service Access component/instance and one or more specialized service proxies (shown in FIG. 2B and described hereinbelow) which actually invoke services on behalf of the Service Access component and mediate between the services and the call control, if necessary.
– Services (more universally, Service Logic Environment 206) which may be implemented using several technologies, e.g., IN/AIN/WIN Service Control Points, non-IN-related application servers (e.g., Parlay application server), call control-resident services (e.g., Java executables), service scripts (e.g., SIP CPL, SIP CGI, etc.), or mobile agents.
– A user profile (described in greater detail hereinbelow with respect to FIG. 2D) which is used by the various components to invoke the right services at the right time. This user profile may partly be co-resident with the call control module, or reside at a remote location that is retrievable. In addition, the profile may preferably be modifiable by various applications, including services implemented as mobile agents.

It should be realized that the universal service invocation and realization architecture

set forth above advantageously reconciles existing as well as those yet to come IP VAS solutions in a coherent and powerful execution and realization environment.

Functionally, when the call/connection control module 202 is activated pursuant to a call being made by an IP entity such as, for example, a calling party, a called party, gatekeeper, or an MGC, a suitable Call Control State Machine (CCSM) 208 is effectuated for providing a mechanism for detecting when the control needs to be passed to the Service Access server module 204. As set forth above, the service proxy actually invokes services on behalf of the Service Access component therein and operates a mediating interface between the services and the call control. Preferably, the functionality of the Service Access server 204 includes determining service events and their order based on the inputs - and possibly other conditions, e.g., time - from the call/connection control module 202. The Service Access server 204 also determines the location of appropriate service logic (WIN and/or non-WIN) for carrying out the service events. In relation thereto, the functionality of the service proxies may include the following tasks:

- encapsulate service triggers, etc.;
- mediate between service client and service server by using appropriate call models, protocols, logics, et cetera; and
- provide event buffering.

The service logic environment 206 includes appropriate service logic and operates as a server for the services provided by the network. It is typically implemented as a service or application node in the network and is coupled to the Service Access server 204 via any suitable interface such as for example, HTTP, Java RMI, Corba, ASCII/IP, etc. Furthermore, as will be explained hereinbelow, some of the services may be local as well.

From a service execution perspective, the three modules inter-operate as follows: The call/connection control module 202 preferably corresponds to the functionality of WIN/IN Call Control Function (CCF). It implements the CCSM 208, handles call-related user interactions and signaling, and performs basic call control processing. Its connection to the provisioning of VAS consists of: being able to suspend call processing depending on the type of DP or DPs encountered, creating a Service Access component as part of the

Service Access server and passing control information thereto when call processing is to be suspended, and handle VAS answers and/or requests.

The service proxies of the Service Access server handle interactions with the service logic, whether it is local or stored at a remote location. The service proxies may also evaluate service criteria, sequence service triggers (also referred to as Feature Interaction Management or FIM), generate actual triggers and handles requests from the service logic environment 206.

The service logic environment 206 executes appropriate service logic or logic portions ("logics"). It may be provided either locally or remotely with respect to the call/connection control module 202. In accordance with WIN architecture, the service logic environment 206 preferably comprises an SCP node that is accessed remotely. It arbitrates and resolves contentions among multiple service logics for execution, if necessary.

From a VAS perspective, the responsibilities of each functional module are as follows: The call/connection control module 202 is preferably provided with the awareness as to when services may possibly be executed. Preferably, this knowledge comes with the initial retrieval of the end-user profile from the user profile repository 168 (depicted in FIG. 1B). However, in a presently preferred exemplary embodiment of the present invention, the call/connection control module 202 may not possess any knowledge with respect to whether a service is in fact to be executed, and if so, whether one or more services are to be sequenced and what the services are.

The service proxies are preferably provided as modules which evaluate whether one or more services are to be executed or not. In a presently preferred exemplary embodiment, these proxies do not know what the services are, although they are aware of the specific service invoking mechanisms. The service logic environment module 206 is the module that is actually aware of the services to be executed. Preferably, based on the decisions taken by the service logic or logics, it provides a unique answer to the proxies in the Service Access server 204.

As stated elsewhere in the patent application, the present invention is directed to providing the capability in IP entities such as terminals (H.323 or SIP), etc. of accessing

If exception handling, process exception, notify end-user, notify call manager and terminate

Exit Event:

An indication of incoming call has been received (Setup) (DP: Facility_Selected_and_Available)

2. *Call Present (State 604)*

Entry Event:

An indication of incoming call has been received (Setup)

PIC: Present_Call

Functions:

In case no more information is required, issue a corresponding indication (Setup Acknowledge)

Otherwise, unless the end-user has decided otherwise, issue an indication that the setup request has been received (Call Proceeding)

If the end-user has explicitly stated to do so, alert the end-user and issue and altering indication (Alerting)

If the end-user has explicitly stated to do so, directly accept the call by issuing a corresponding indication (Connect)

If the end-user has explicitly stated to do so, directly reject the setup by issuing a corresponding indication (Call Release)

Exit Event:

A call proceeding indication has been issued (DP: Facility_Selected_and_Available)

An alerting indication has been issued (DP: Call_Accepted)

A connect indication has been issued (DP: T_Answer)

A call release indication has been issued (DP: T_No_Answer)

A call release indication has been received (DP: T_Abandon)

3. *Call Proceeding (State 606)*

Entry Event:

A call proceeding indication has been issued

PIC: Present_Call

Functions:

Present the call to the end-user and set a short timer

If the end-user cannot be contacted, issue a busy indication (Call Release)

Otherwise, if the end-user answers the call before the timeout, issue an indication that the call is accepted (Connect)

Otherwise, issue an indication that the end-user is being alerted (Alerting)

Exit Event:

A call release indication has been issued (DP: T_Busy)

An indication that the end-user is being alerted has been issued (DP: Call_Accepted)

An indication that the call is answered has been issued (DP: Call_Answered)

A call release indication has been received (DP: T_Abandon)

4. *Overlap Receiving (State 608)*

Entry Event:

A setup acknowledge indication has been issued

An Information message has been received

PIC: No PIC

Functions:

Wait for an Information message

Analyze the information

If still not enough, issue another Setup Acknowledge indication

In enough information has been received, present the call to the end-user

If the end-user cannot be contacted, issue a busy indication (Call Release)

Otherwise, issue and indication that the end-user is being alerted (Alerting)

Exit Event:

An Information message has been received

A call release indication has been issued (DP: T_Busy)

An indication that the end-user is being alerted has been issued (DP: Call_Accepted)

An indication that the call is answered has been issued (DP: Call_Answered)

A call release indication has been received (DP: T_Abandon)

5. *Call Received (State 610)*

Entry Event:

An indication that the end-user is being alerted has been issued (DP: Call_Accepted)

PIC: T_Alerting

Functions:

Set a timer and wait for a response from the end-user

If the end-user answers the call, issue a corresponding indication (Connect)

If the end-user refuses the call, issue a corresponding location (Call Release)

After timeout, issue an indication that the end-user does not answer (Call Release)

Exit Event:

A call release has been issued (DP: T_No_Answer)

A call release has been received (DP: T_Abandon)

A connect indication has been issued (DP: T_Answer)

6. *Call Active (State 612)*

Entry Event:

A connect indication has been issued

PIC: T_Active

Functions:

Notify session manager (H.245) that the call is active

Wait for event

Exit Event:

End-user requests a feature (DP: T_Mid_Call)

End-user clears the call (DP: T_Disconnect)

Receives the disconnect message from network or called party (Call Release) (DP: T_Disconnect)

FIG. 5B depicts a SIP terminal's T_CCSM in particular detail. It should be realized that the SIP terminal's T_CCSM is substantially similar to that of the H.323 terminal described in greater detail above. Accordingly, only the salient differences therebetween are set forth below.

Essentially, a new state, state 613, is added in the T_CCSM of a SIP terminal.

7. *Confirmation Awaited (State 613)*

Entry Event:

A connect indication has been issued

PIC: None

Functions:

Notify session manager that a confirmation of the call setup is awaited

Wait for event

Exit Event:

Confirmation of the call setup has been received from the calling party (DP: T_Mid_Call)

End-user clears the call (DP: T_Disconnect)

Receives the disconnect message from network or called party (Call Release) (DP: T_Disconnect)

In addition, it should also be noted that the DPs and PICs associated with the ***Call Active*** state, which is now entered from the ***Confirmation Awaited*** state, are is appropriately modified. Also, no specific entry event is required for this state.

FIGS. 6A and 6B depict message flow diagrams for two exemplary embodiments of a call diversion service, respectively, in accordance with the teachings of the present invention. While it is well-known, the H.323/H.450 framework supports several "flavors"

of call diversion (SS-DIV flavors, for example, Call Forward Unconditional (SS-CFU), Call Forward Busy (SS-CFB), and Call Forward No Reply (SS-CFNR)), there is no provision for a time-dependent Call Forward service. FIGS. 6A and 6B illustrate how the existing H.450 services may be enhanced or extended by using the teachings of the present invention.

Referring in particular to FIG. 6A, a message flow diagram of an exemplary embodiment of a time-dependent Call Forward service is shown therein. When terminal-1 172A (TA) issues a Call Setup request 1102, terminal-2 172B (TB) responds by a Call Proceeding message 1104, indicating that TB will subsequently answer the request. Thereafter, TB's T_CCSM encounters an armed DP (Facility_Selected_and_Available) and generates a corresponding trigger 1106 to the SCP 190. Pursuant to the DP, the call control is passed to the SCP 190 which provides an appropriate Result 1108. The SCP 190 is aware that a Call Forward service dependent on date and time has been set up for the subscriber/TB combination and that the call should be diverted to terminal-3 172C (TC). The Result 1108 from the SCP 190 contains the appropriate instruction for the call diversion.

Responsive to the Result 1108 from the SCP 190, TB issues towards TA 172A an H.225.0 Facility message 1110, including an encapsulated H.450.3 Call Re-Routing Invoke request. TA 172A accepts the request by issuing an acknowledgment message (Facility) 1112 and releases the call by sending a Release Complete message 1114 to TB 172B.

Thereafter, TA 172A issues a Call Setup message 1116 to TC 172C, with an H.450.3 field indicating that the call has been re-routed from TB 172B. TC 172C directly informs TA that the subscriber is being alerted by issuing an Alerting message 1118. Once the subscriber answers the call, a Connect message 1120 is sent from TC to TA.

The message flow diagram depicted in FIG. 6B illustrates a variation on the time-dependent Call Forward service described above. It can be readily seen that the messages are essentially similar and, accordingly, only the salient features are set forth below.

Once the T_CCSM of TB 172B encounters the armed DP (Facility_Selected_and_Available), the call control is passed to the SCP 190 which is

aware that the a Call Forward service dependent on date and time has been activated for the subscriber/terminal-2. If, for some reason, the call should not be diverted at the selected date/time, TB is instructed to resume normal call processing, by sending an appropriate Result 1208 thereto. Thereafter, TB instructs TA that the subscriber is being alerted (Alerting 1210) and that the call is established (via a Connect message 1212).

FIG. 7 depicts a message flow diagram for an exemplary embodiment of a hunt group service provided in accordance with the teachings of the present invention. When the end-user, TA 172A, requests for a Call Setup, providing as number the identification of a Virtual Private Network (VPN) group, the O_CCSM of TA 172A stops upon encountering armed Collected_Information and Analyzed_Information DPs and a trigger is provided to the SCP 190. Responsive thereto, the SCP 190 determines that a hunt group service is to be executed. That is, a call setup must be attempted with a list of the terminating parties, in a pre-defined order, until one of them eventually answers the call. In one embodiment, the SCP 190 may simply provide the list of numbers to TA 172A and stop, provided TA 172A is VAS-enabled to handle such a list and execute the associated logic. In an alternative embodiment, the SCP 190 may instruct the terminal step-by-step as to what needs to be done. The message flow diagram in FIG. 7 contemplates this alternative scheme.

When the control is passed to the SCP via trigger 1302 on account of the armed DP, the SCP 190 instructs TA 172A (via Result 1304) to set up a call with TB 172B, and dynamically arms the following DPs: O_No_Answer, O_Called_Party_Busy, and O_Answer. Thereafter, TA 172B sends a call setup request 1306 to TB 172B. A Call Proceeding message 1308 is issued to TA 172A, indicating that TB will subsequently answer the request. TB alerts the end-user (Alerting 1310), but nobody answers the call. As a consequence, TB issues a Call Release Complete message 1312 indicating that there is no answer to the call setup attempt by TA 172A. The O_CCSM of TA encounters the O_No_Answer DP and issues a corresponding event 1314 to the SCP 190. The SCP 190 then proceeds to the next number in the hunt group list, re-requests (via result 1316) the terminal (TA) to attempt a call setup with TC terminal, and dynamically arms the same DPs

as set forth above with respect to the TB call setup.

TA 172A sends a Call Setup 1318 to TC 172C which returns a Release Complete message 1320, indicating that there is no answer. Once again, the O_CCSM of TA encounters the O_No_Answer DP and issues a corresponding event 1322 to the SCP 190. The SCP takes the next number in the hunt group list and proceeds in the same manner as described hereinbefore. In this illustration, terminal TD 172D of the list answers the call and provides a Connect message 1330 to TA. Thereafter, the O_CCSM of TA encounters the O_Answer DP and issues a corresponding notification 1332 to the SCP 190 to terminate its service logic.

Referring now to FIGS. 8A - 8F, depicted therein are several examples of service invocation and realization in accordance with the teachings of the present invention. An Originating CCSM, such as one discussed in detail hereinabove with respect to FIG. 4, with appropriate DPs is exemplified in these exemplary embodiments. Self-explanatory scenarios involving local access, mobile agent access, external SCP access, etc. are illustrated.

Based upon the foregoing, it should be readily appreciated by those skilled in the art that the present invention provides an advantageous solution for accessing service nodes from end terminals disposed in an IP network by combining the service architectures from the IP and WIN/IN realms into a hybrid approach. Because in the present invention the terminals are allowed to access the service logics in a remote location, the limitation of reduced number of services available within a terminal has been overcome. Further, because the service logics can resolve conflicts and contentions among services and their execution, service interaction issues that are prevalent in the IP-based service architectures have been resolved. On the other hand, the scalability issues common to the network-centric WIN/IN approach have been eliminated on account of the integration of the IP service architecture.

In addition, deficiencies in the current technologies with respect to service mobility are also overcome. Because the IP terminal is in a client-server relationship with the service node server, the mobility of the terminal is no longer a constraint on accessing the service

node server, which can be via INAP or IS-41 over SS7, or in some instances, via Java, Corba, etc. Moreover, service mobility is assured because if any intelligent appliance capable of accessing the Internet/WWW and download a piece of code, which essentially is a client's behavioral image expected by the service node server, the appliance can be used for accessing the services. Accordingly, a plethora of communication appliances/devices may be used in accordance herewith: Information appliances, personal/laptop/palmtop computers, Personal Digital Assistants, smart phones, TDMA/CDMA/GSM mobile phones, et cetera.

Moreover, by utilizing the teachings of the present invention, the WIN/IN service logic base that is already installed and market-tested may continue to be re-used even as VoIP network architectures come into existence. Those of ordinary skill in the art should realize that there exist tremendous incentives, economic as well as infrastructure-based, for network operators to re-use the expensive legacy SCP nodes as they migrate towards integrating the cellular infrastructures with IP-based PSNs. Also, because the logic switching is provided within the terminal, services can be dynamically altered or allocated. For example, in the current network-centric Call Forward-Unconditional (CFU) service, all calls are forwarded to a C-number whether or not the subscriber wishes to manually override the call forwarding. With the terminal logic provided in accordance with the teachings of the present invention, the terminal can interrogate the subscriber for the actual call forwarding. Additionally, since some services may be made resident within the terminal itself, individualized service provisioning is possible.

The advantages of providing IP-based VAS in accordance with the universal service invocation and realization architecture provided in the present invention may thus conveniently be summarized as below:

- permits flexible addition and/or removal of services;
- integrates various service implementations, ranging from "one size fits all" to extremely customized services;
- permits the reuse of existing IN/WIN service nodes;
- SCPs and Application Servers may deal with complex service interaction

issues and support universal access;

– applicable to various networks (e.g., SIP, H.323) and their VAS solutions (e.g., SIP CPL/CGI, H.450, IN-like, etc.).

In particular, further advantages are evident when implemented in IP terminals:

– makes use of terminal capabilities and relieves network nodes from VAS-related tasks;
– implementation is simple and "lightweight";
– no constraint on network nodes to support standard call models and access to services (e.g., INAP, CAP, ANSI-41, etc.);
– supports universal access to VAS;
– favors interaction with end-user and other local applications (e.g., Web browser, etc.).

Although the VAS architecture of the present invention has been exemplified with particular reference to a H.323-based IP network, it should be understood that other IP network implementations such as, for example, SIP-based networks, may also be used for practicing the teachings contained herein. In the case of a SIP-based network, DP-dependent service triggering may be performed from SIP terminals, SIP proxies or gateways, SIP redirects (collectively, SIP entities), wherein the SIP entities are provided with the CCSMs appropriately modified in accordance herewith. The call control functionality described hereinabove with respect to H.323 implementations is also applicable for a SIP-based implementation and, accordingly, a "dual mode" IP terminal that is SIP- as well as H.323-compliant, in addition to WIN/IN, may be provided advantageously within an IP network.

Further, it is believed that the operation and construction of the present invention will be apparent from the foregoing Detailed Description. While the method and system shown and described have been characterized as being preferred, it should be readily understood that various changes and modifications could be made therein without departing from the scope of the present invention as set forth in the following claims. For example, although the teachings of the present invention have been exemplified with a particular SS

within the context of the H.450.X Recommendations, it should be understood that other SSs under the existing or future H.450.X Recommendations may also be provisioned in accordance with the teachings of the present invention. That is, in addition to the Call Forward and hunt group services exemplified herein, the teachings hereof may be also applied in the context of numerous other services, for example, toll free and credit card calling, selective call restriction, click to fax, double phone / free phone, split charging, and multimedia applications such as tele-medicine, tele-education, video-on-demand, et cetera.

Furthermore, while pluralities of H.323-based terminals have been described in the exemplary embodiments of the present invention, any combination of non-H.323 entities such as mobile stations operable with a variety of air interface standards may be provided for the purposes of the present invention. The IP-based terminals may take several forms themselves: Personal Digital Assistants, Internet phones, laptop computers, personal computers, palmtop computers, pagers, and Information Appliances. In addition, the innovative teachings contained herein may also be practiced in a VoIP network coupled to a PSTN, wherein the fixed entities can trigger service requests to a service node. Accordingly, it should be realized that these and other numerous variations, substitutions, additions, re-arrangements and modifications are contemplated to be within the ambit of the present invention whose scope is solely limited by the claims set forth below.

WHAT IS CLAIMED IS:

1. A method of accessing a service node from an end terminal disposed in an integrated telecommunications network having a Voice-over-Internet Protocol (VoIP) network portion and a cellular network portion, the method comprising the steps of:

providing an interface module disposed between the service node and the VoIP network portion;

incorporating at least one detection point in a call control process provided with the end terminal, wherein the detection point operates to pass control to a service access server when the call control process encounters the detection point;

determining, by the service access server, if a service needs to be executed;

if so, sending a service request from the service access server to the service node for service execution;

receiving, in the service access server, a result from the service node responsive to the service request; and

passing the result from the service access server to the call control process.

2. The method of accessing a service node from an end terminal disposed in an integrated telecommunications network as set forth in claim 1, wherein the service request is sent from the service access server to the service node over a HyperText Transfer Protocol (HTTP) interface.

3. The method of accessing a service node from an end terminal disposed in an integrated telecommunications network as set forth in claim 1, wherein the service request is sent from the service access server to the service node over a Java interface.

4. The method of accessing a service node from an end terminal disposed in an integrated telecommunications network as set forth in claim 1, wherein the service request is sent from the service access server to the service node over a Corba interface.

5. The method of accessing a service node from an end terminal disposed in an integrated telecommunications network as set forth in claim 1, wherein the service request is sent from the service access server to the service node over an IP interface.

6. A service provisioning method for invoking a Wireless Intelligent Network (WIN) service by an end terminal disposed in an integrated telecommunications network having a packet-switched network (PSN) portion and a cellular network portion, the method comprising the steps of:

effectuating a call control process in the end terminal;

determining, in the end terminal, if an armed detection point is encountered by the call control process;

if so, creating a service access instance and passing control thereto;

creating a service proxy associated therewith;

accessing by the service proxy a service node disposed in the cellular network portion;

executing a service logic portion in the service node to obtain a result; and

providing the result to the call control process in the end terminal.

7. The service provisioning method as set forth in claim 6, wherein the armed detection point is provided by a service access server disposed in the end terminal.

8. The service provisioning method as set forth in claim 7, wherein the armed detection point is acquired by the service access server from a user profile repository disposed in the integrated telecommunications network, the user profile repository including a list of active triggers for the end terminal and a subscriber associated with the end terminal.

9. The service provisioning method as set forth in claim 6, wherein the service logic portion comprises a call diversion service.

10. The service provisioning method as set forth in claim 6, wherein the service logic portion comprises a hunt group service.

11. The service provisioning method as set forth in claim 6, wherein the service logic portion comprises a time-dependent call diversion service.

12. The service provisioning method as set forth in claim 6, wherein the service node is accessed using a HyperText Transfer Protocol (HTTP) interface.

13. The service provisioning method as set forth in claim 6, wherein the service node is accessed using a Java interface.

14. The service provisioning method as set forth in claim 6, wherein the service node is accessed using a Corba interface.

15. The service provisioning method as set forth in claim 6, wherein the service node is accessed using an IP interface.

16. An integrated telecommunications network comprising:

a packet-switched network (PSN) portion including one or more end terminals;

a circuit-switched network (CSN) portion coupled to the PSN portion via a gateway;

a service node disposed in the CSN portion, the service node including service logic portions for executing one or more services and being coupled to the PSN portion via an interface;

a user profile repository disposed in the PSN portion, the user profile repository including a list of triggers for a particular end-terminal-and-subscriber combination;

call control means in the end terminal for controlling a call process;

a service access server in the end terminal that evaluates service requests and creates service proxies based thereon,

wherein the call control means passes control to the service access server when an armed detection point based on the list of triggers is encountered in the call process such that a service proxy places a request to the service node for executing a service logic portion.

17. The integrated telecommunications network as set forth in claim 16, wherein the interface comprises a HyperText Transfer Protocol (HTTP) interface.

18. The integrated telecommunications network as set forth in claim 16, wherein the interface comprises a Java interface.

19. The integrated telecommunications network as set forth in claim 16, wherein the interface comprises a Corba interface.

20. The integrated telecommunications network as set forth in claim 16, wherein the end terminal is selected from the group consisting of a Personal Digital Assistant, an Internet phone, a laptop computer, a personal computer, a palmtop computer, a pager and an Information Appliance.

21. The integrated telecommunications network as set forth in claim 16, wherein the PSN portion comprises an H.323 network and the end terminal comprises an H.323 terminal.

22. The integrated telecommunications network as set forth in claim 16, wherein the PSN portion comprises a SIP network and the end terminal comprises a SIP terminal.

23. An integrated telecommunications network having a generalized service invocation and realization architecture, comprising:

one or more call control modules including a plurality of service-related detection points that are Intelligent Network (IN)-compliant;

a Service Logic Environment implemented to execute a service logic portion;

a Service Access server coupled to the Service Logic Environment, the Service Access server including a Service Access component created when an armed detection point is encountered and one or several service proxies operating to invoke a service on behalf of the Service Access component, the service proxies mediating between the Service Logic Environment and the call control modules; and

a user profile structure specifying the information as to when a service is to be invoked for a particular mobile subscriber.

24. The integrated telecommunications network as set forth in claim 23, wherein the service logic portion corresponds to a local service.

25. The integrated telecommunications network as set forth in claim 23, wherein the service logic portion corresponds to a mobile agent-based service.

26. The integrated telecommunications network as set forth in claim 23, wherein the service logic portion corresponds to a remote service residing in a Service Control Point (SCP) node.

27. The integrated telecommunications network as set forth in claim 23, wherein the call control module resides in an H.323 terminal.

28. The integrated telecommunications network as set forth in claim 23, wherein the call control module resides in an H.323 gatekeeper.

29. The integrated telecommunications network as set forth in claim 23, wherein the call control module resides in a SIP entity.

30. The integrated telecommunications network as set forth in claim 23, wherein the call control module resides in a Media Gateway Controller.

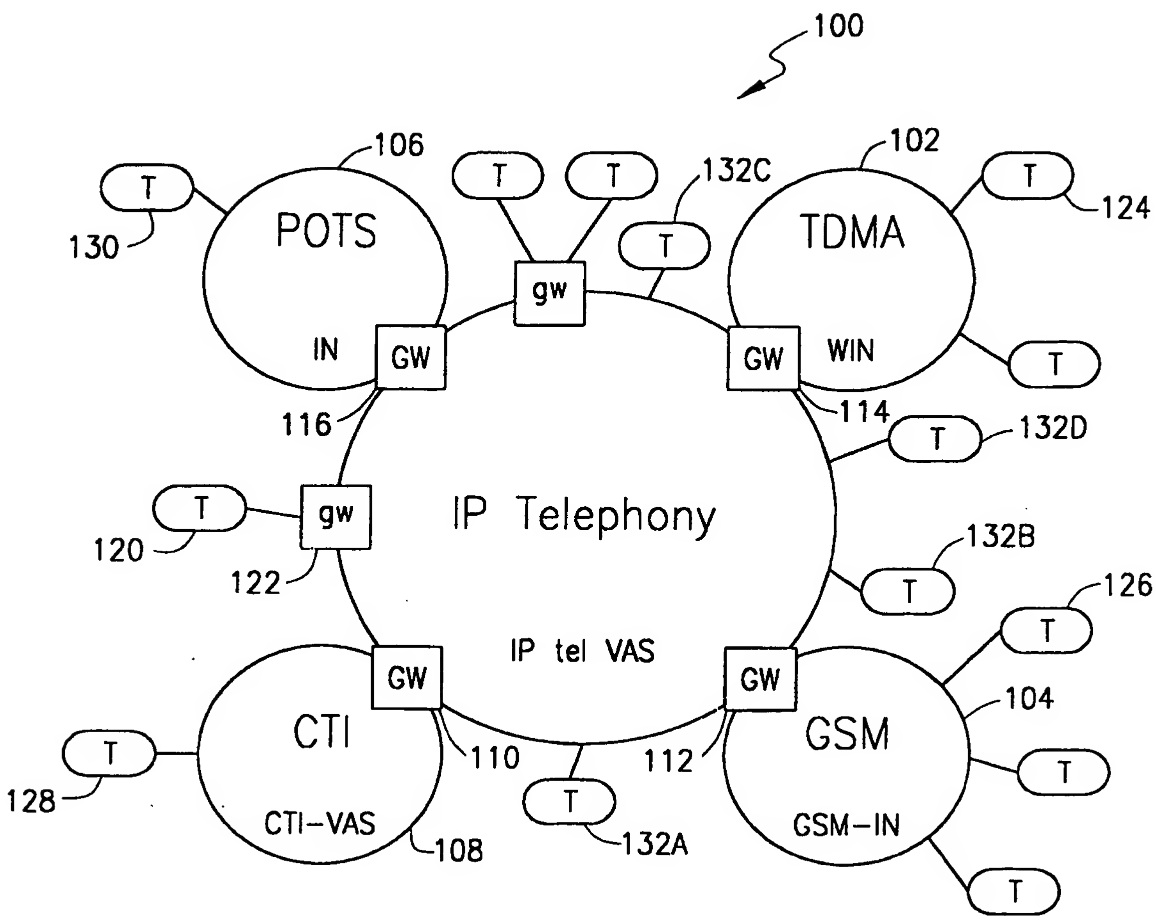

100
106
POTS
IN
130
T
T
T
gw
132C
T
102
TDMA
WIN
T
124
T
GW
GW
116
114
T
132D
T
gw
120
122
IP Telephony
132B
T
126
T
IP tel VAS
GW
GW
104
CTI
CTI-VAS
T
128
110
112
T
132A
108
GSM
GSM-IN
T
T

FIG. 1A

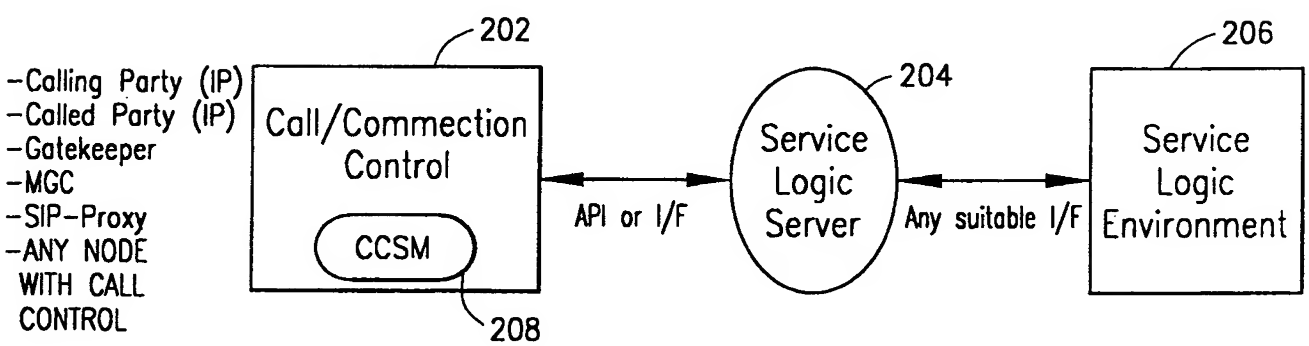

202
-Calling Party (IP)
-Called Party (IP)
-Gatekeeper
-MGC
-SIP-Proxy
-ANY NODE WITH CALL CONTROL
Call/Commection Control
CCSM
208
API or I/F
204
Service Logic Server
Any suitable I/F
206
Service Logic Environment

FIG. 2A

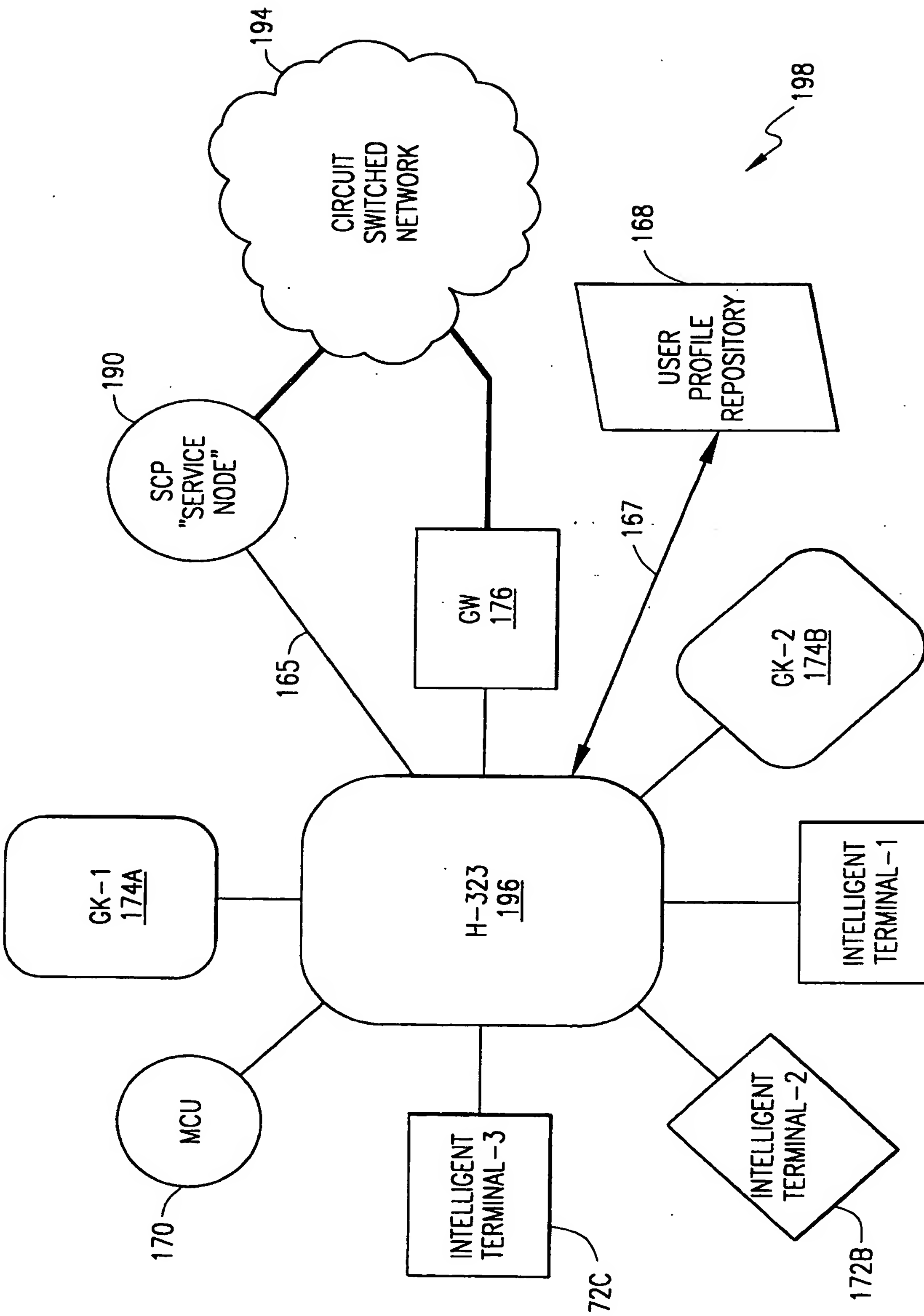

194
CIRCUIT SWITCHED NETWORK
198
168
USER PROFILE REPOSITORY
190
SCP "SERVICE NODE"
GW 176
167
165
GK-2 174B
GK-1 174A
H-323 196
INTELLIGENT TERMINAL-1
172A
MCU
170
INTELLIGENT TERMINAL-3
172C
INTELLIGENT TERMINAL-2
172B

FIG. 1B

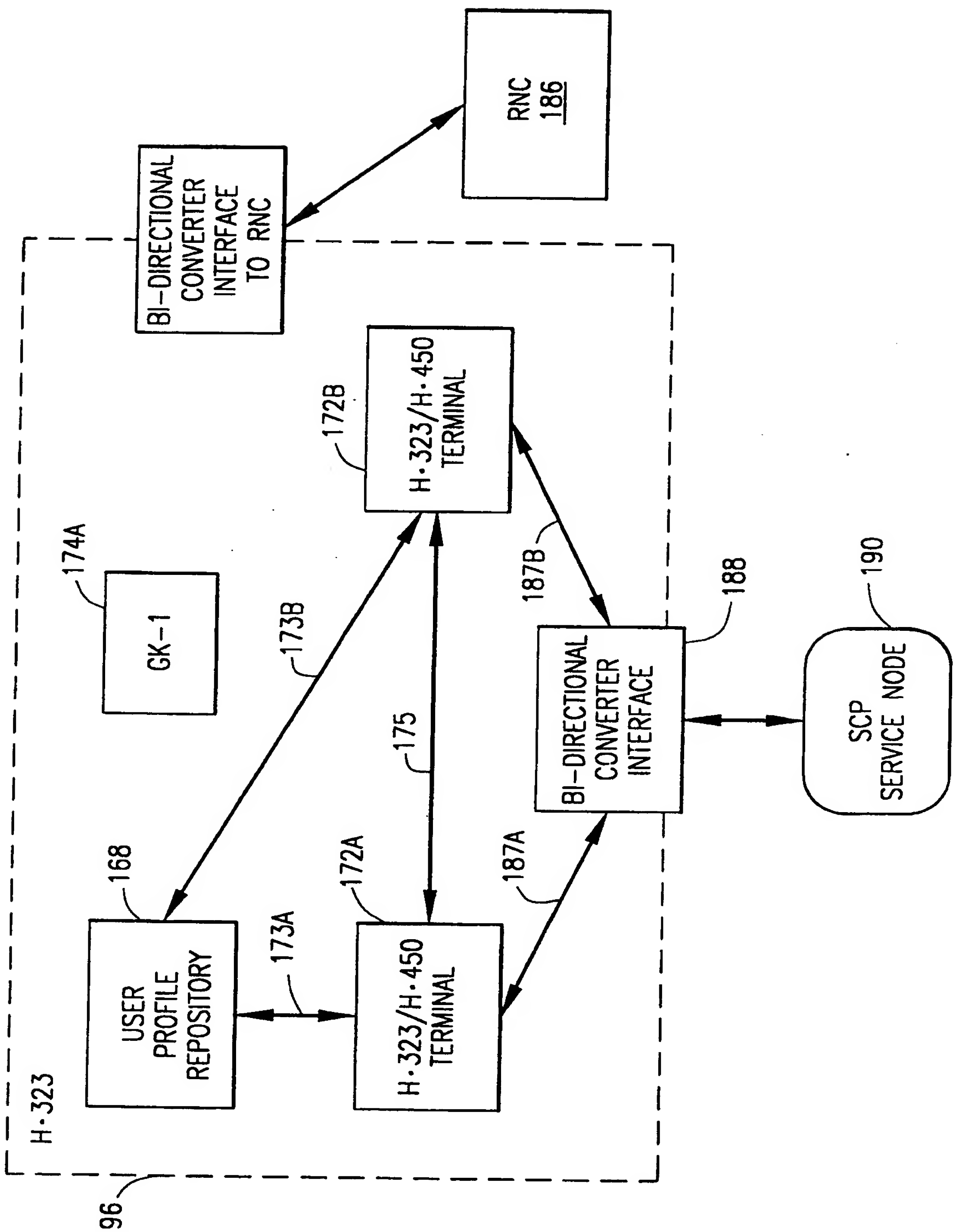

RNC
186
BI-DIRECTIONAL CONVERTER INTERFACE TO RNC
H·323/H·450 TERMINAL
172B
174A
GK-1
173B
175
187B
188
190
BI-DIRECTIONAL CONVERTER INTERFACE
SCP SERVICE NODE
168
172A
187A
173A
USER PROFILE REPOSITORY
H·323/H·450 TERMINAL
H·323
196

FIG. 1C

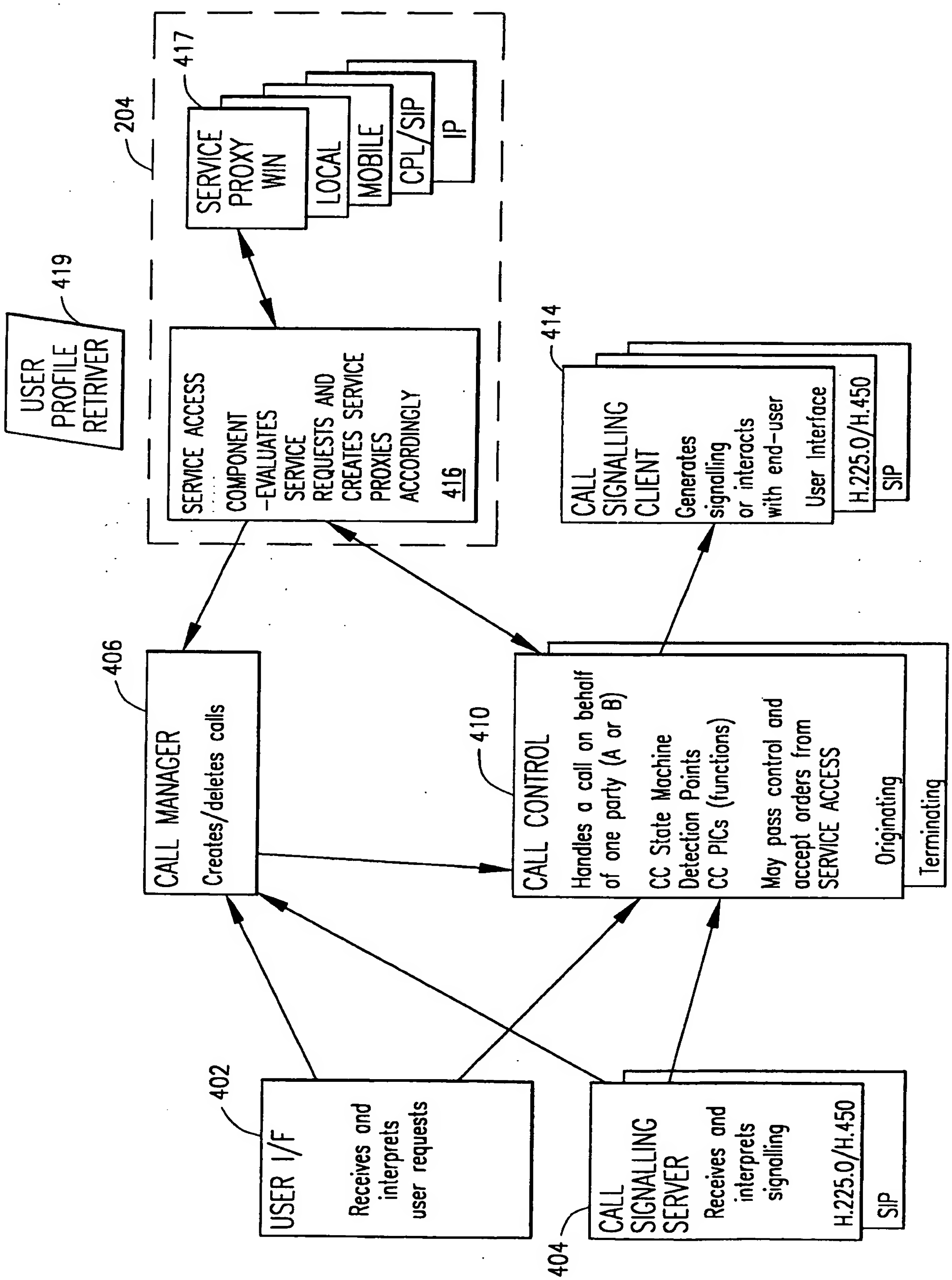

204
417
SERVICE PROXY WIN
LOCAL
MOBILE
CPL/SIP
IP
USER PROFILE RETRIVER
419
SERVICE ACCESS COMPONENT -EVALUATES SERVICE REQUESTS AND CREATES SERVICE PROXIES ACCORDINGLY
416
414
CALL SIGNALLING CLIENT Generates signalling or interacts with end-user
User Interface
H.225.0/H.450
SIP
406
CALL MANAGER Creates/deletes calls
410
CALL CONTROL
Handles a call on behalf of one party (A or B)
CC State Machine Detection Points CC PICs (functions)
May pass control and accept orders from SERVICE ACCESS
Originating
Terminating
402
USER I/F
Receives and interprets user requests
404
CALL SIGNALLING SERVER
Receives and interprets signalling
H.225.0/H.450
SIP

FIG. 2B

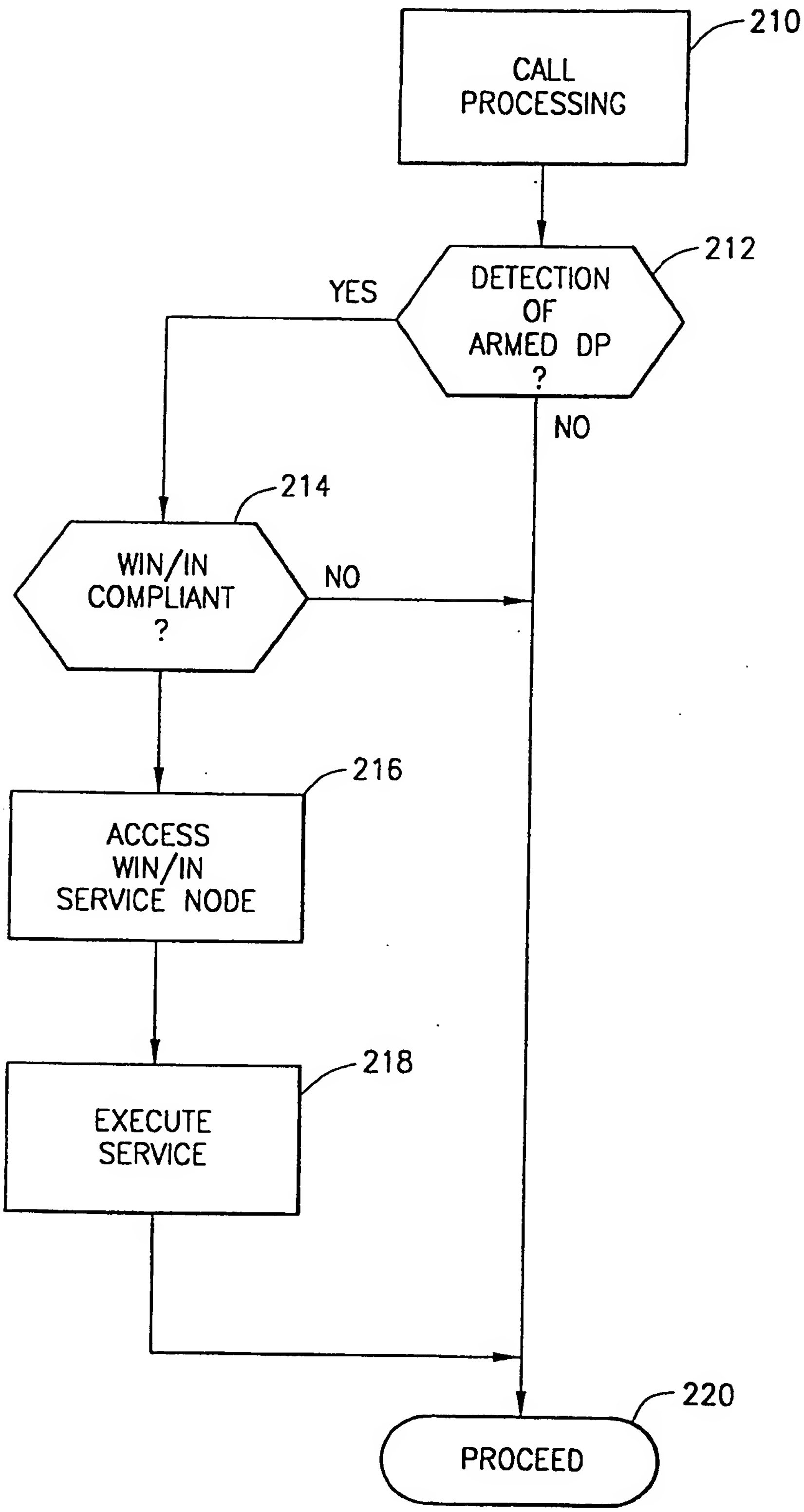

CALL PROCESSING
210
DETECTION OF ARMED DP ?
212
YES
NO
WIN/IN COMPLIANT ?
214
NO
ACCESS WIN/IN SERVICE NODE
216
EXECUTE SERVICE
218
PROCEED
220

FIG. 2C

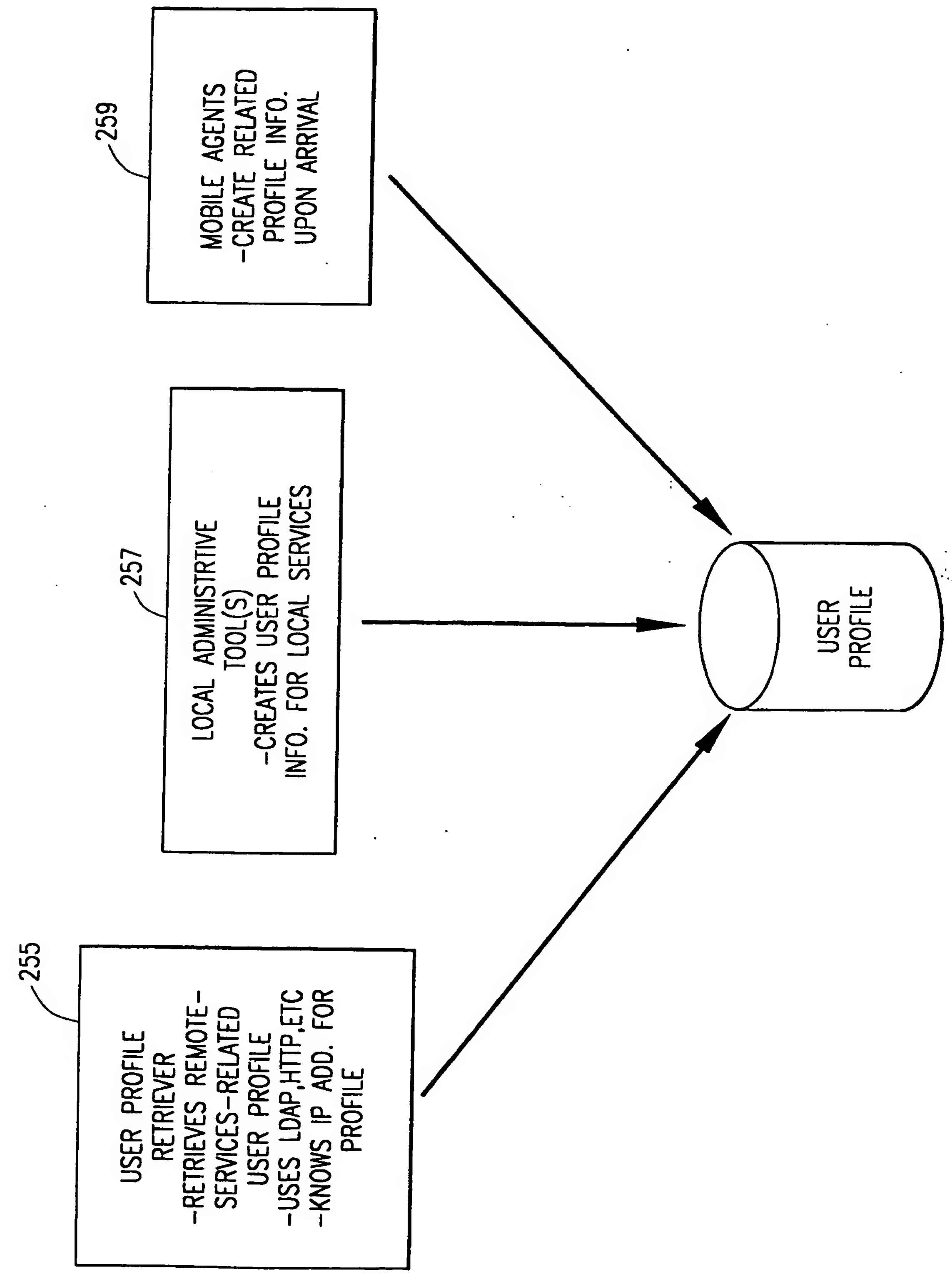

259
MOBILE AGENTS
-CREATE RELATED
PROFILE INFO.
UPON ARRIVAL
257
LOCAL ADMINISTRTIVE
TOOL(S)
-CREATES USER PROFILE
INFO. FOR LOCAL SERVICES
255
USER PROFILE
RETRIEVER
-RETRIEVES REMOTE-
SERVICES-RELATED
USER PROFILE
-USES LDAP,HTTP,ETC
-KNOWS IP ADD. FOR
PROFILE
USER
PROFILE

FIG. 2D

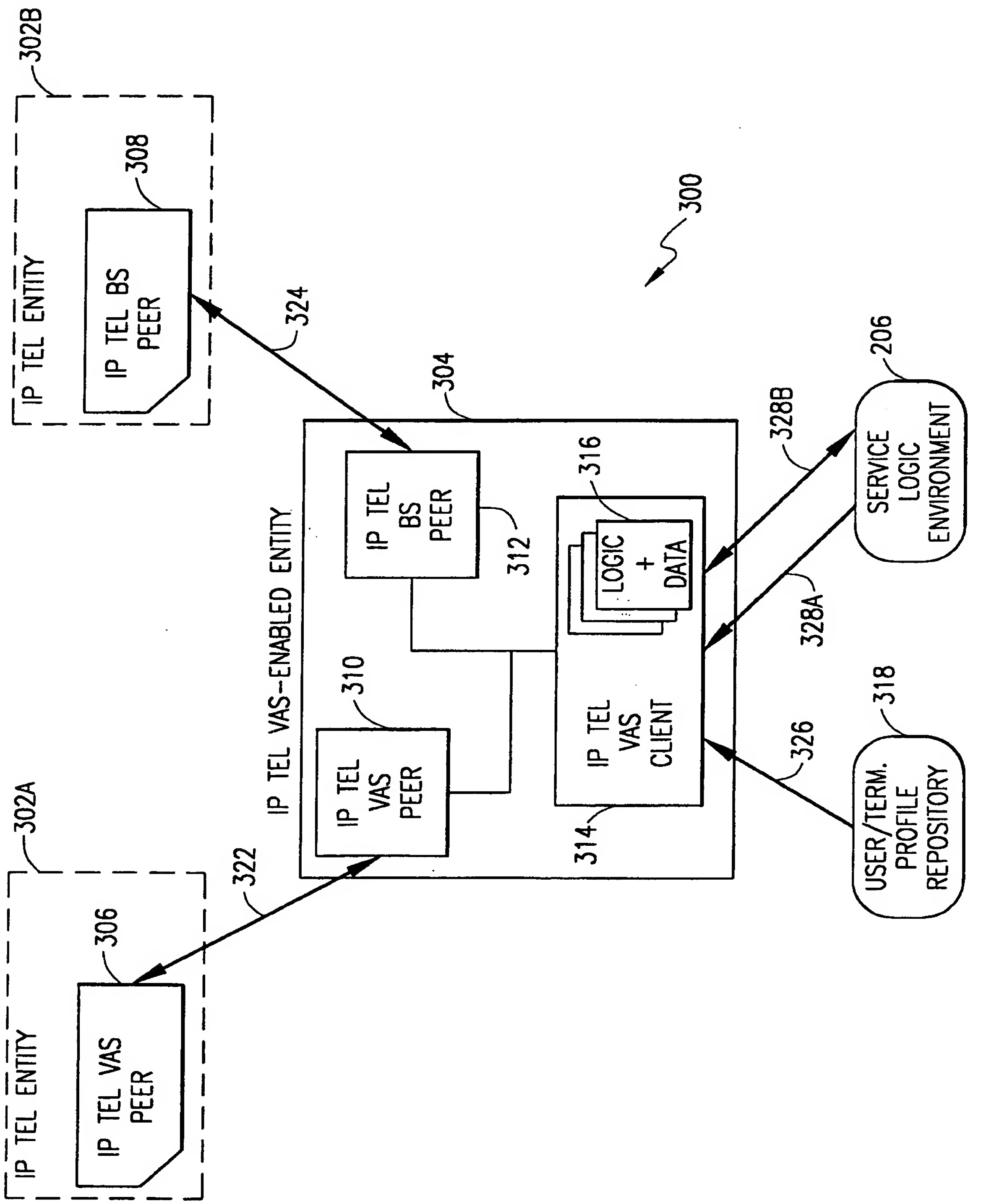

302B
IP TEL ENTITY
308
IP TEL BS PEER
324
300
304
IP TEL VAS-ENABLED ENTITY
IP TEL BS PEER
312
316
LOGIC + DATA
328B
206
SERVICE LOGIC ENVIRONMENT
328A
302A
IP TEL ENTITY
306
IP TEL VAS PEER
322
310
IP TEL VAS PEER
IP TEL VAS CLIENT
314
326
318
USER/TERM. PROFILE REPOSITORY

FIG. 3

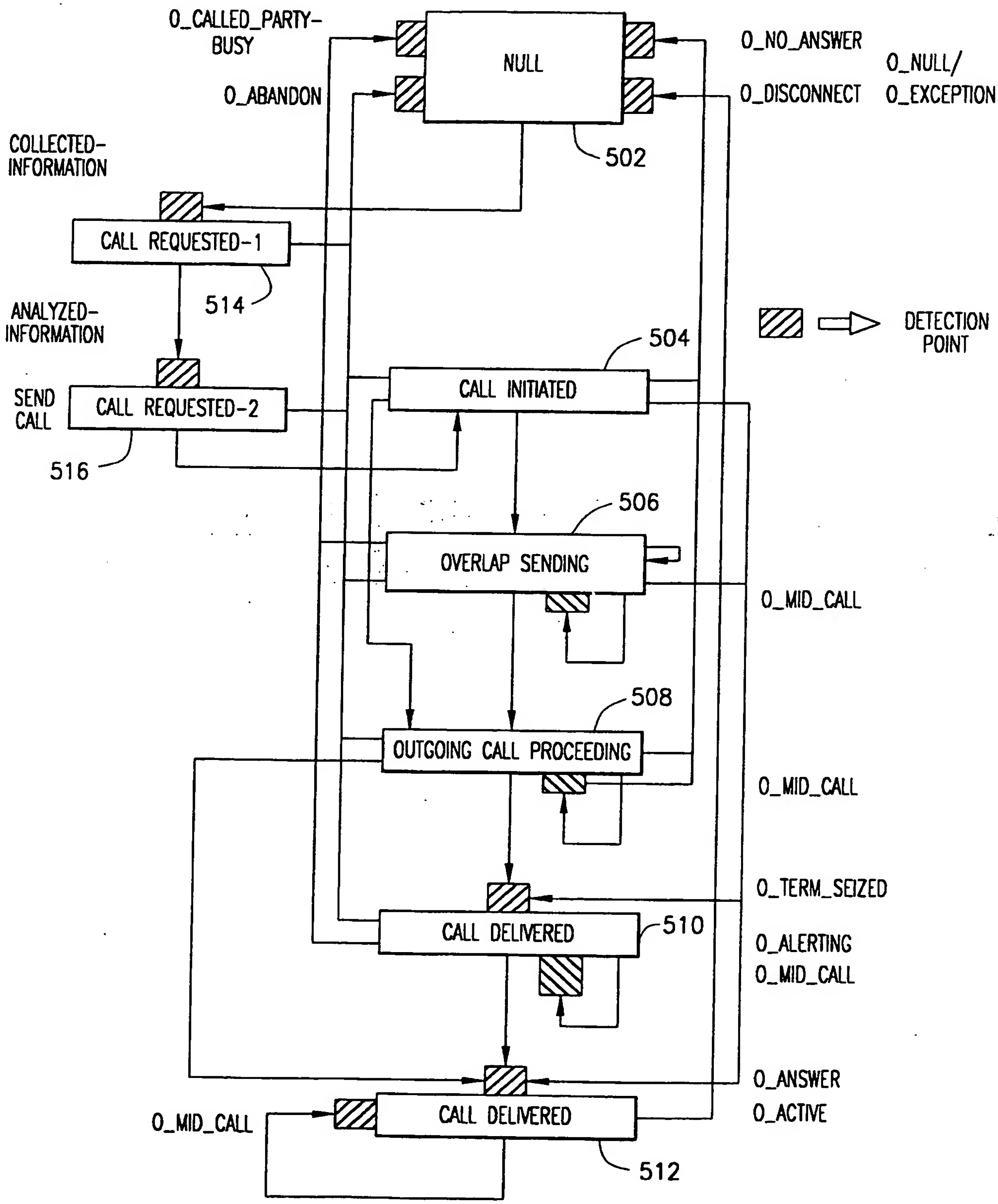

O_CALLED_PARTY-BUSY
NULL
O_NO_ANSWER
O_NULL/
O_EXCEPTION
O_ABANDON
O_DISCONNECT
502
COLLECTED-INFORMATION
CALL REQUESTED-1
514
ANALYZED-INFORMATION
DETECTION POINT
504
SEND CALL
CALL REQUESTED-2
CALL INITIATED
516
506
OVERLAP SENDING
O_MID_CALL
508
OUTGOING CALL PROCEEDING
O_MID_CALL
O_TERM_SEIZED
CALL DELIVERED
510
O_ALERTING
O_MID_CALL
O_ANSWER
O_ACTIVE
O_MID_CALL
CALL DELIVERED
512

FIG. 4

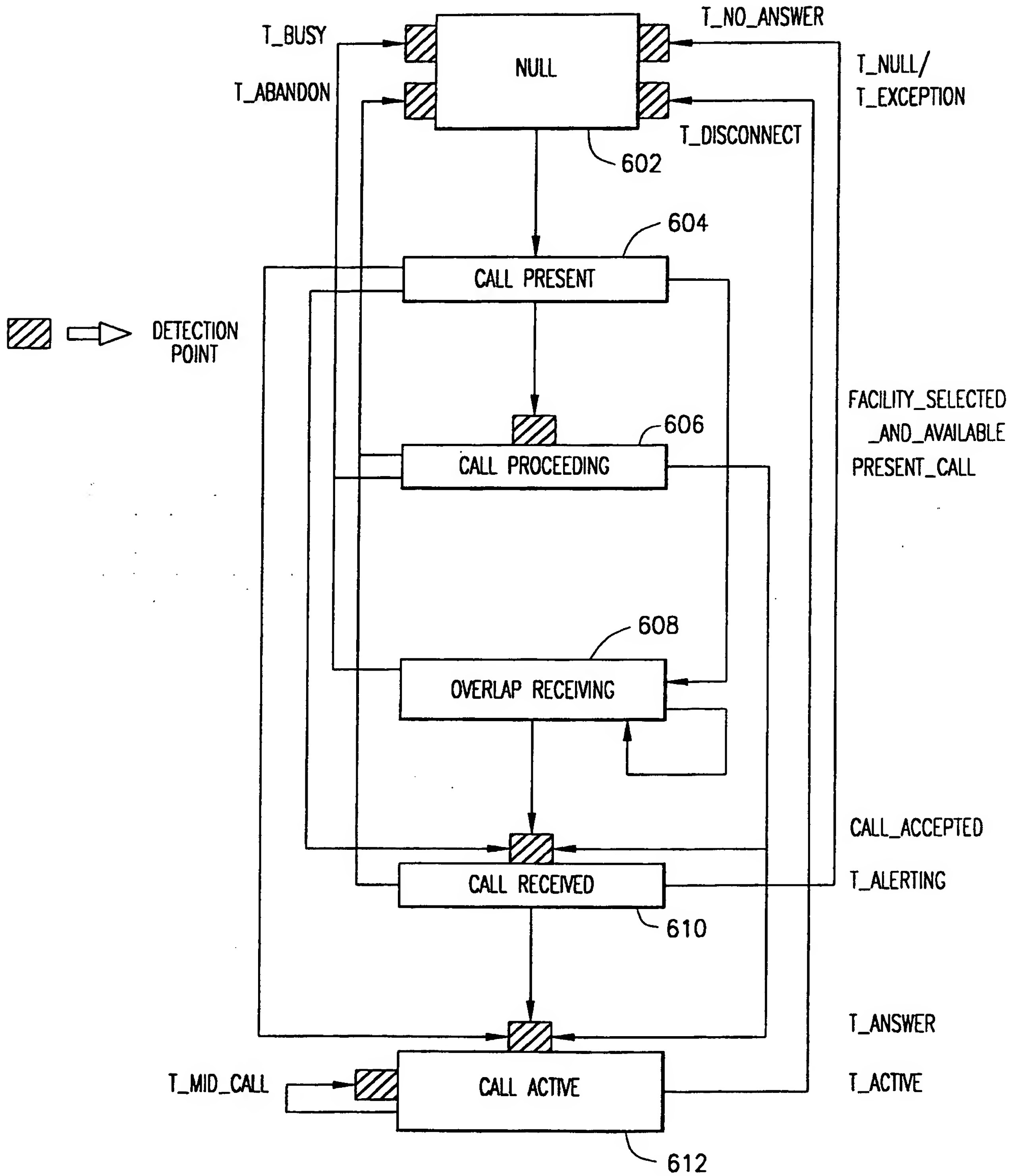

T_BUSY
T_ABANDON
NULL
T_NO_ANSWER
T_NULL/
T_EXCEPTION
T_DISCONNECT
602
604
CALL PRESENT
DETECTION
POINT
606
CALL PROCEEDING
FACILITY_SELECTED
_AND_AVAILABLE
PRESENT_CALL
608
OVERLAP RECEIVING
CALL_ACCEPTED
CALL RECEIVED
T_ALERTING
610
T_ANSWER
T_MID_CALL
CALL ACTIVE
T_ACTIVE
612

FIG. 5A

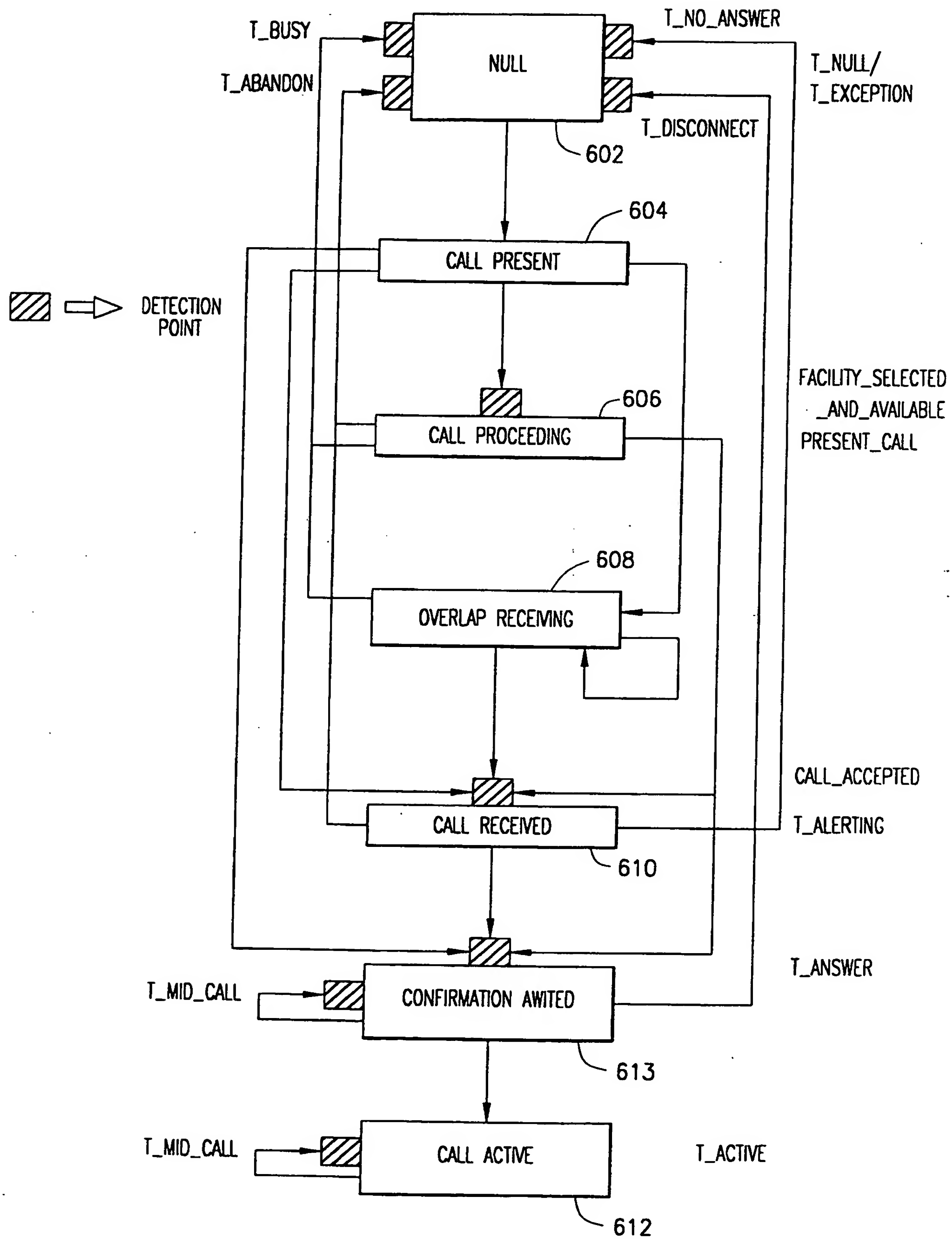

T_BUSY
T_ABANDON
NULL
T_NO_ANSWER
T_NULL/
T_EXCEPTION
T_DISCONNECT
602
604
CALL PRESENT
DETECTION
POINT
606
CALL PROCEEDING
FACILITY_SELECTED
_AND_AVAILABLE
PRESENT_CALL
608
OVERLAP RECEIVING
CALL_ACCEPTED
CALL RECEIVED
T_ALERTING
610
T_ANSWER
T_MID_CALL
CONFIRMATION AWITED
613
T_MID_CALL
CALL ACTIVE
T_ACTIVE
612

FIG. 5B

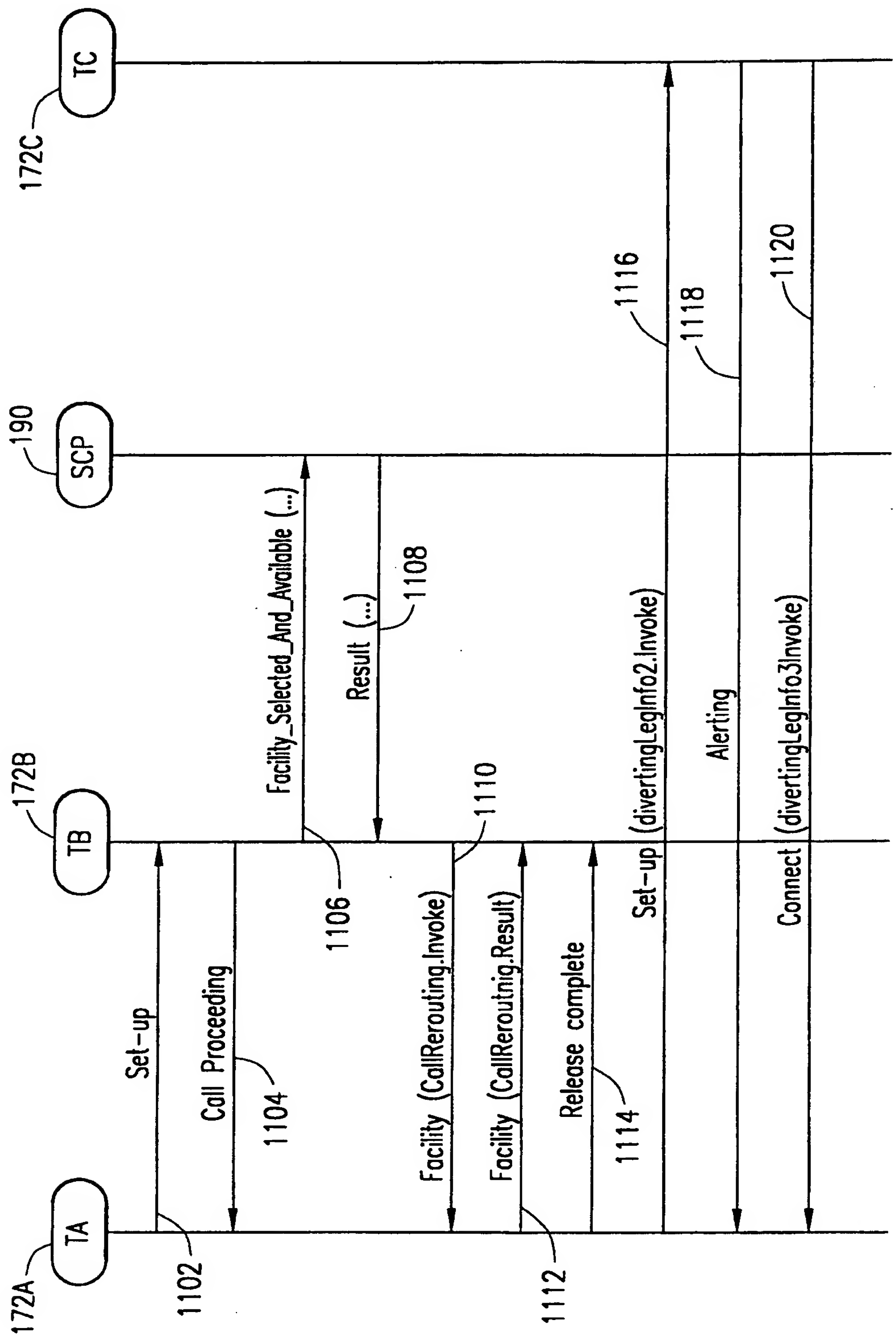

172A
TA
172B
TB
190
SCP
172C
TC
Set-up
1102
Call Proceeding
1104
Facility_Selected_And_Available (...)
1106
Result (...)
1108
Facility (CallRerouting.Invoke)
1110
Facility (CallReroutnig.Result)
1112
Release complete
1114
Set-up (divertingLegInfo2.Invoke)
1116
Alerting
1118
Connect (divertingLegInfo3Invoke)
1120

FIG. 6A

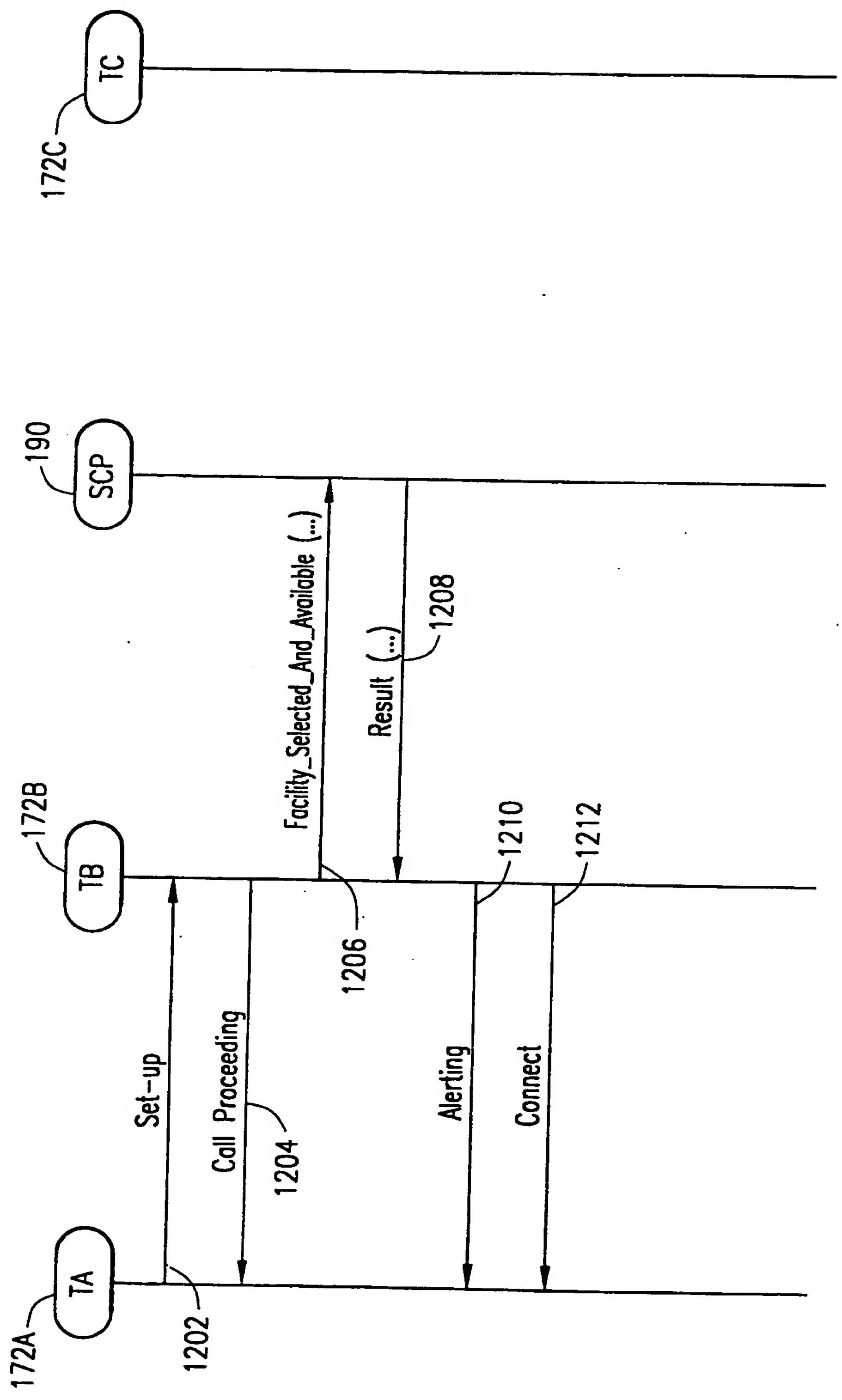

172C
TC
190
SCP
172B
TB
172A
TA
Facility_Selected_And_Available (...)
Result (...)
1208
1206
1210
1212
Set-up
Call Proceeding
1204
Alerting
Connect
1202

FIG. 6B

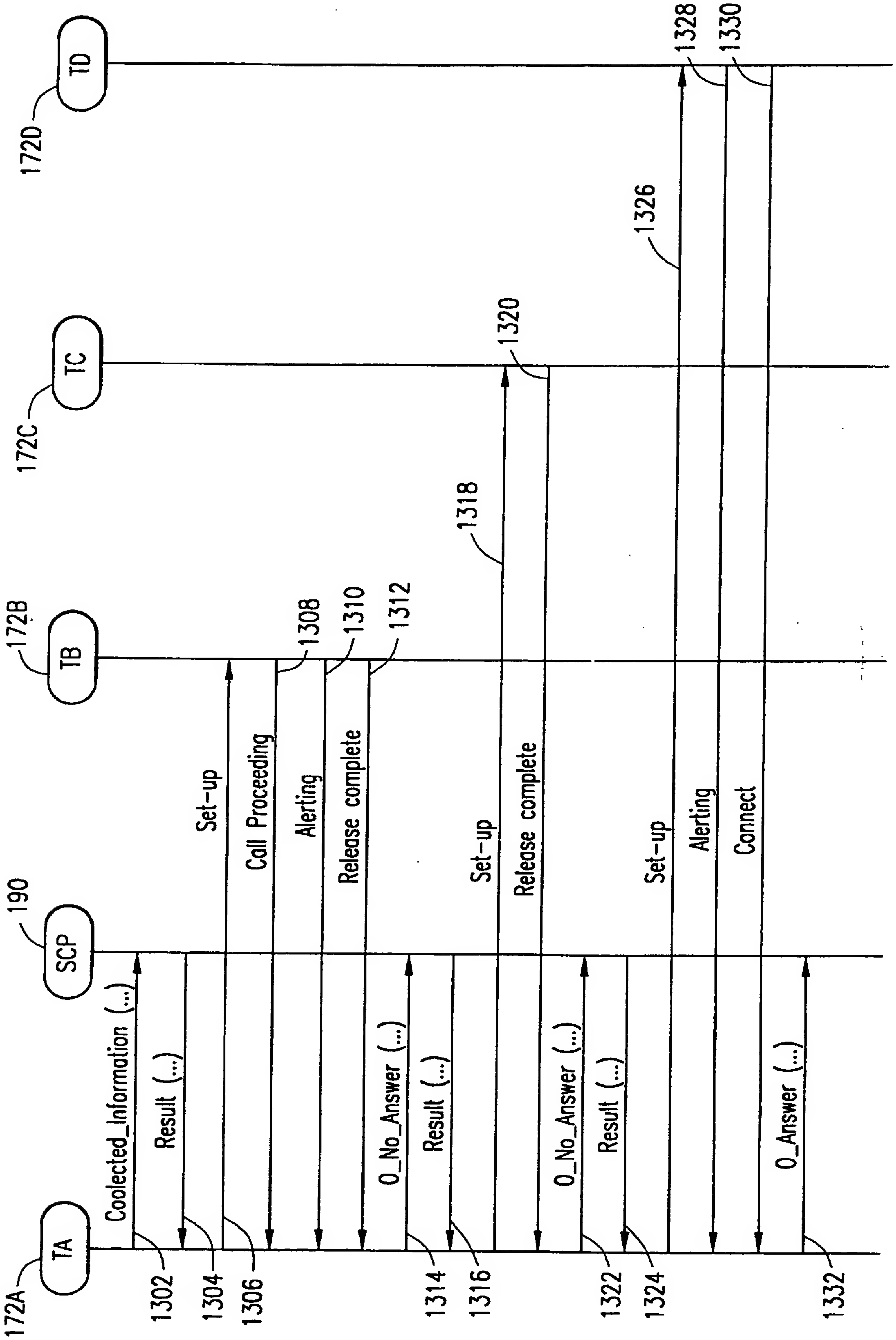

172A
TA
190
SCP
172B
TB
172C
TC
172D
TD
Coolected_Information (...)
Result (...)
Set-up
Call Proceeding
Alerting
Release complete
O_No_Answer (...)
Result (...)
Set-up
Release complete
O_No_Answer (...)
Result (...)
Set-up
Alerting
Connect
O_Answer (...)
1302
1304
1306
1308
1310
1312
1314
1316
1318
1320
1322
1324
1326
1328
1330
1332

FIG. 7

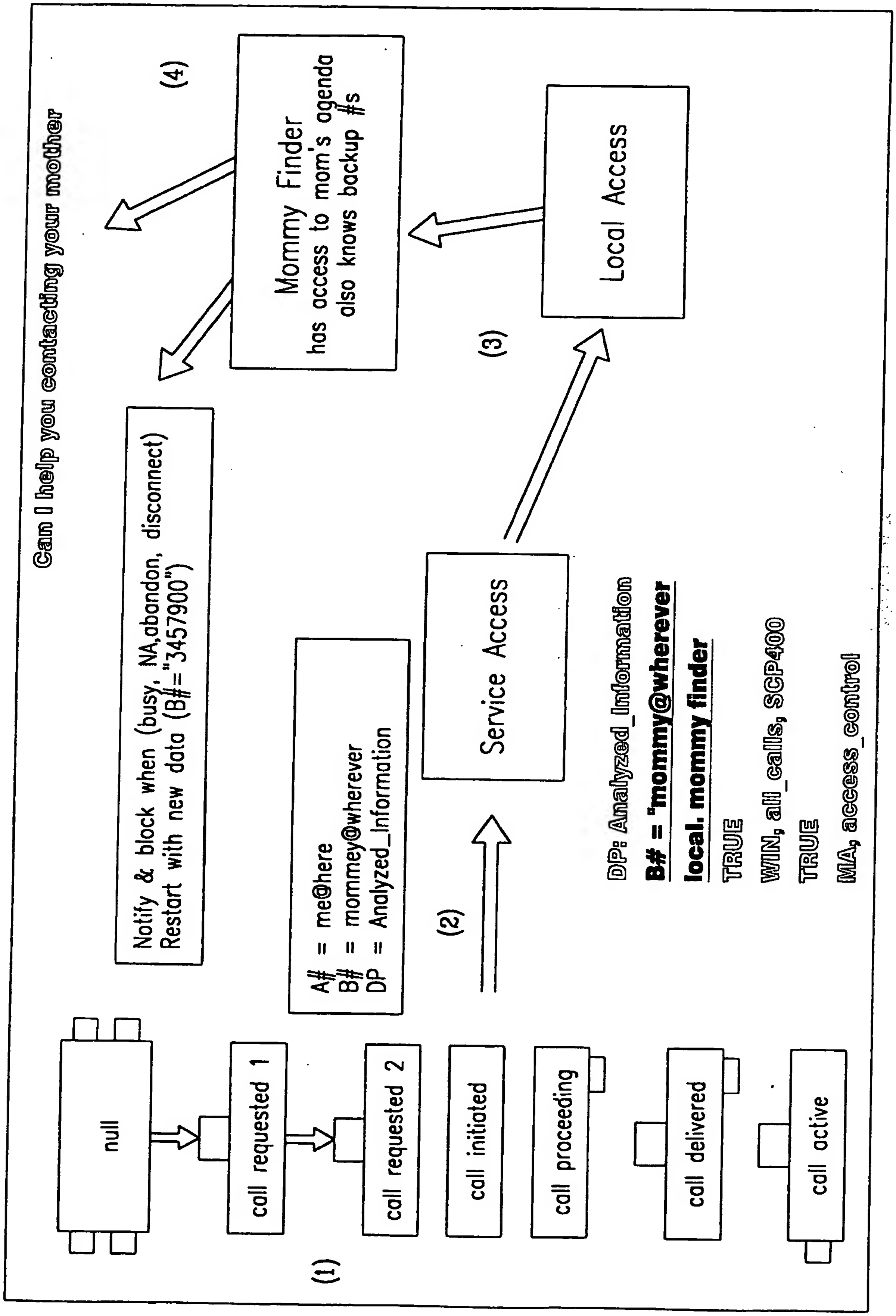

Can I help you contacting your mother
(4)
Mommy Finder
has access to mom's agenda
also knows backup #s
Local Access
(3)
Notify & block when (busy, NA,abandon, disconnect)
Restart with new data (B#="3457900")
Service Access
A# = me@here
B# = mommey@wherever
DP = Analyzed_Information
(2)
DP: Analyzed_Information
B# = "mommy@wherever
local. mommy finder
TRUE
WIN, all_calls, SCP400
TRUE
MA, access_control
null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active
(1)

FIG. 8A

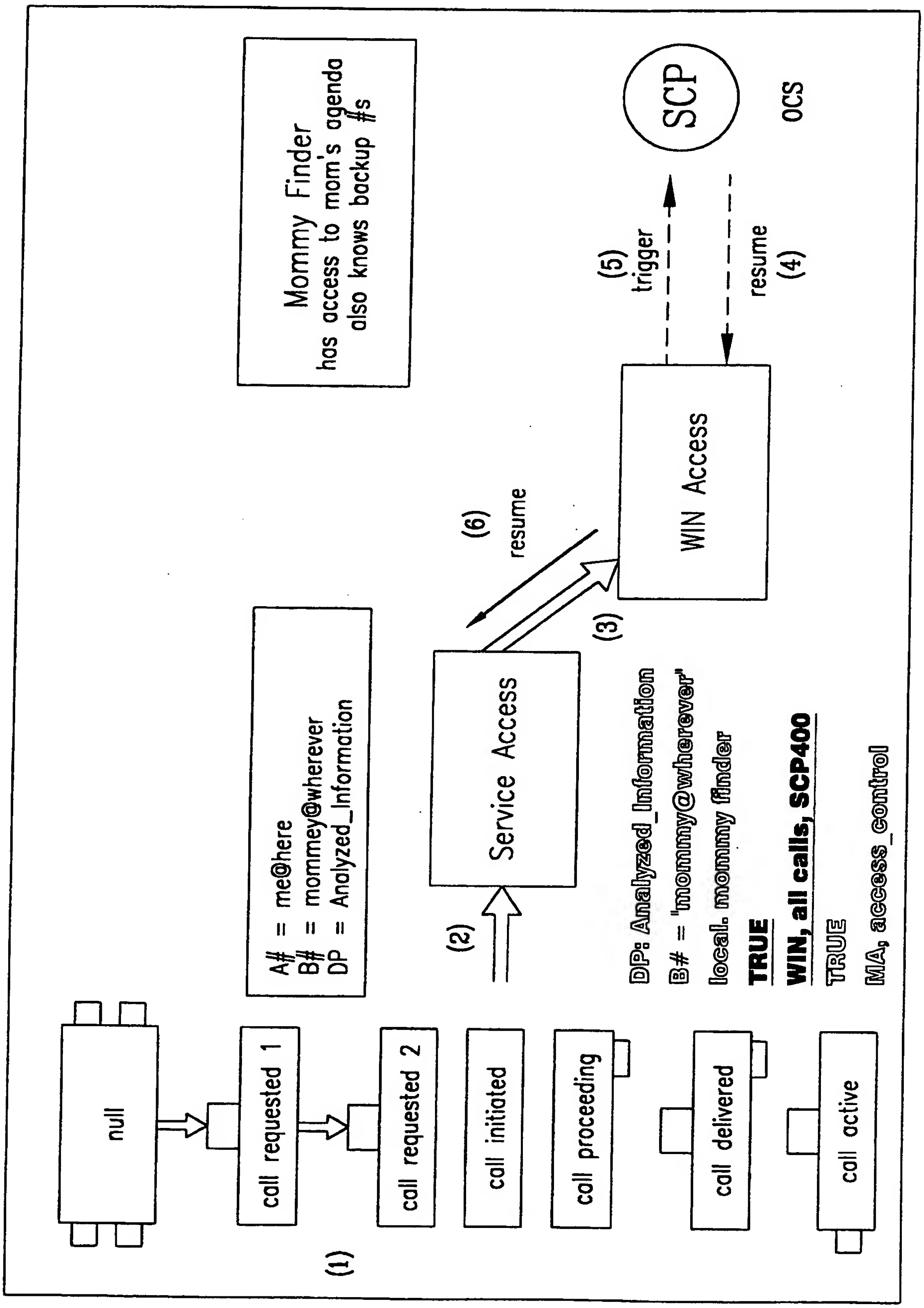

null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active
(1)
A# = me@here
B# = mommey@wherever
DP = Analyzed_Information
(2)
Service Access
(3)
(6)
resume
WIN Access
(5)
trigger
resume
(4)
SCP
OCS
Mommy Finder
has access to mom's agenda
also knows backup #s
DP: Analyzed_Information
B# = "mommy@wherever"
local. mommy finder
TRUE
WIN, all calls, SCP400
TRUE
MA, access_control

FIG. 8B

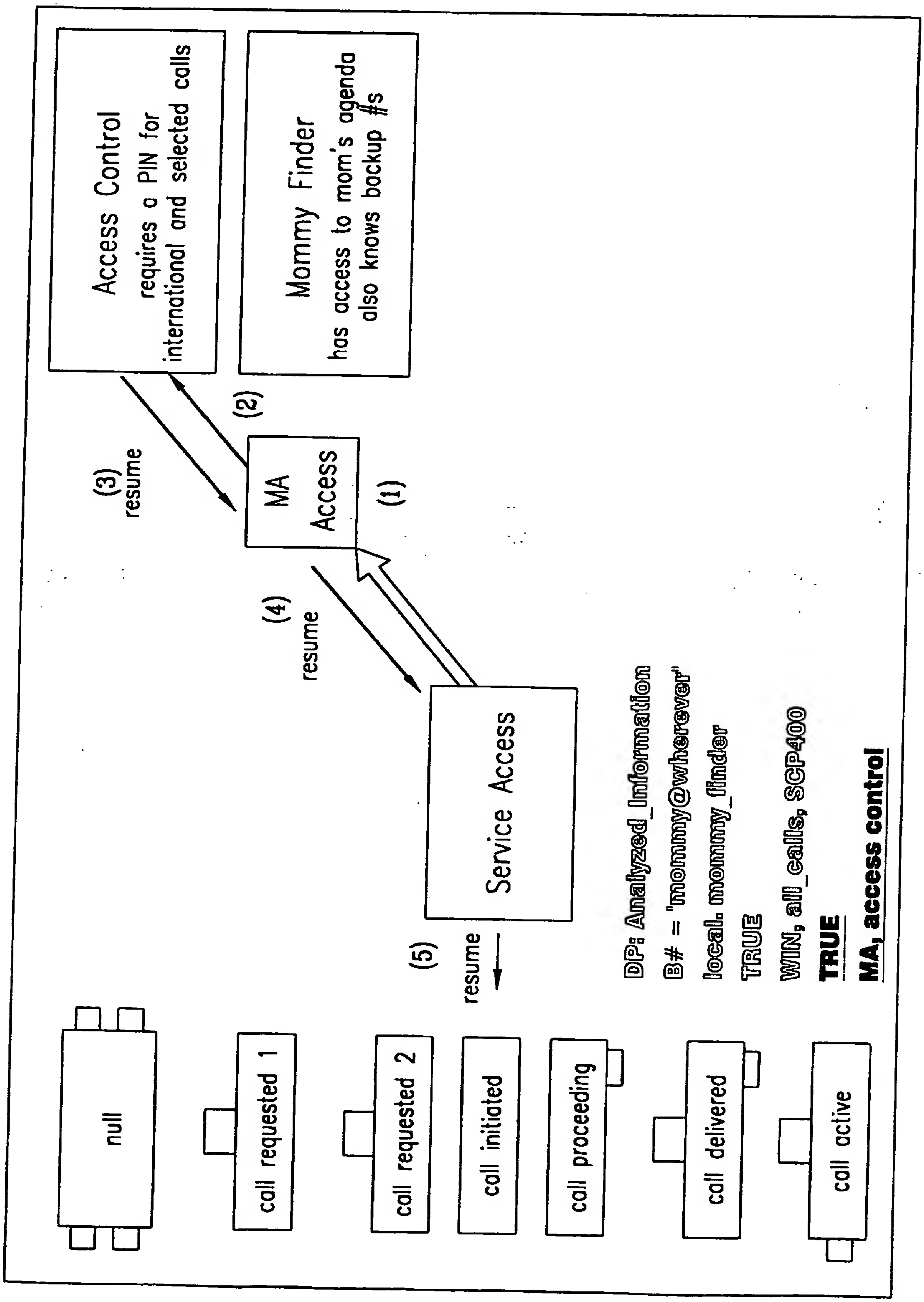

Access Control
requires a PIN for
international and selected calls
Mommy Finder
has access to mom's agenda
also knows backup #s
(2)
(3)
resume
MA
Access
(1)
(4)
resume
Service Access
(5)
resume
DP: Analyzed_Information
B# = "mommy@wherever"
local, mommy_finder
TRUE
WIN, all_calls, SCP400
TRUE
MA, access control
null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active

FIG. 8C

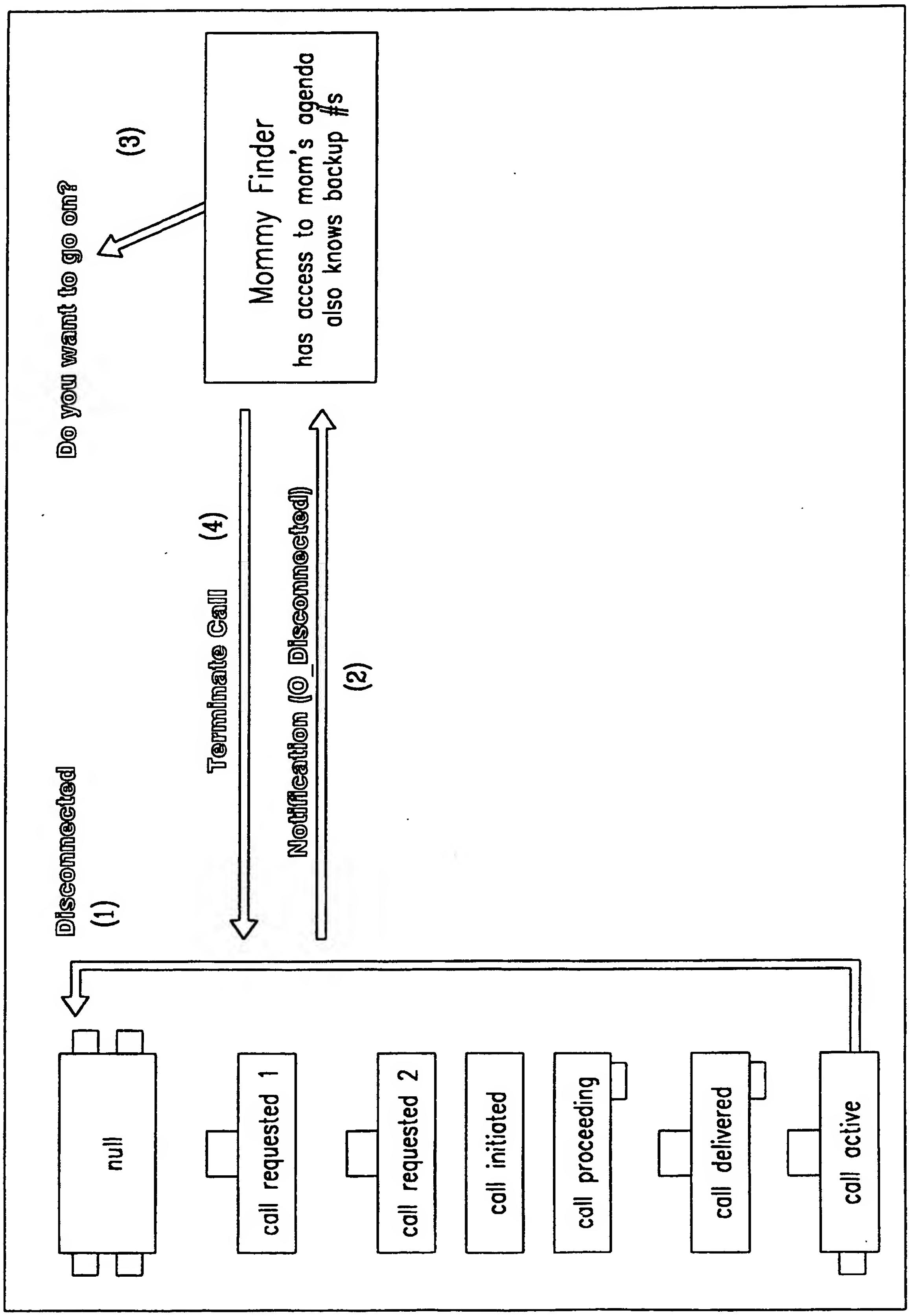

Do you want to go on?
(3)
Mommy Finder
has access to mom's agenda
also knows backup #s
Disconnected
(1)
Terminate Call
(4)
Notification (O_Disconnected)
(2)
null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active

FIG. 8D

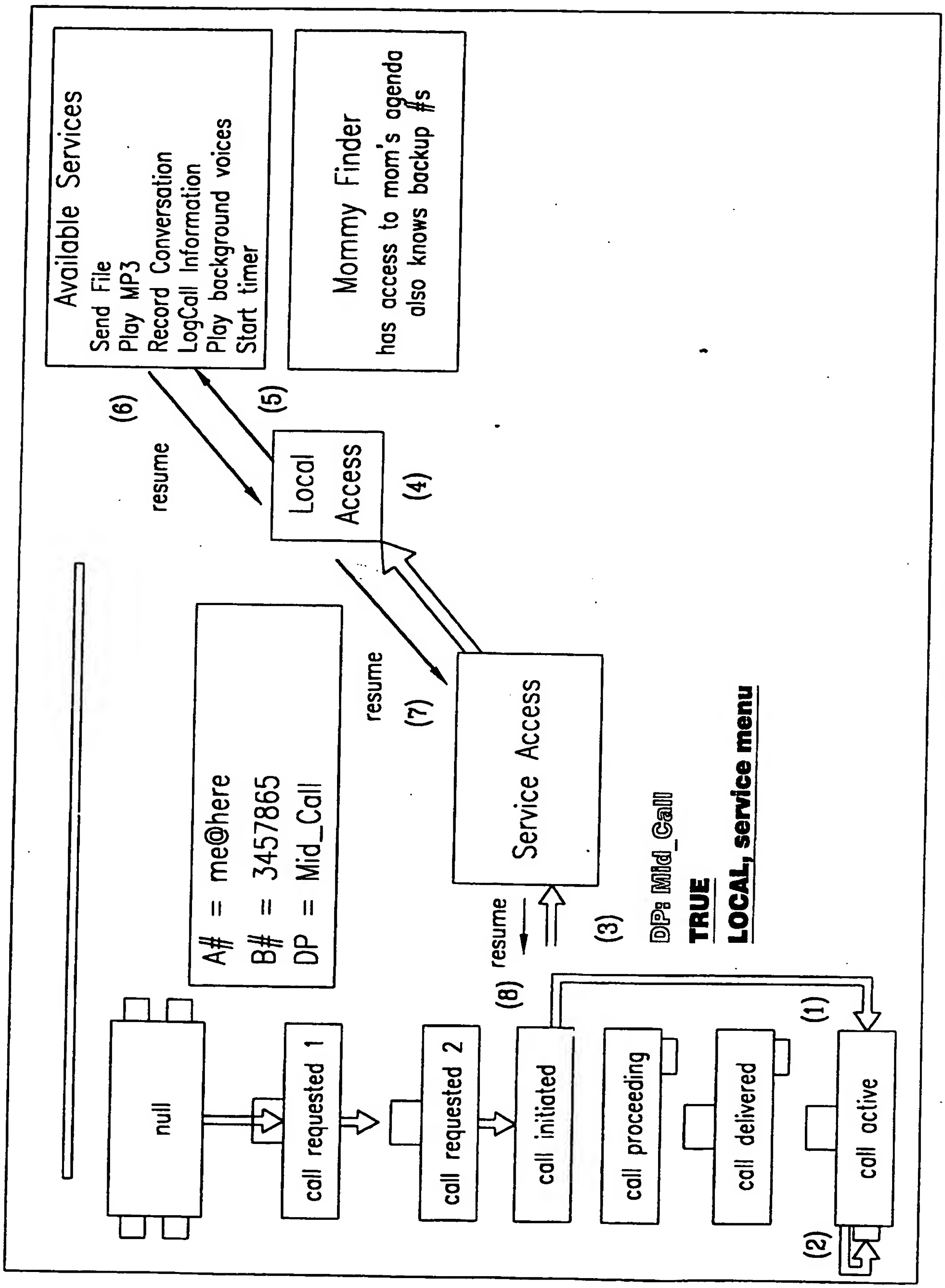

Available Services
Send File
Play MP3
Record Conversation
LogCall Information
Play background voices
Start timer
Mommy Finder
has access to mom's agenda
also knows backup #s
(6)
resume
(5)
Local Access
(4)
A# = me@here
B# = 3457865
DP = Mid_Call
resume
(7)
Service Access
resume
(8)
(3)
DP: Mid_Call
TRUE
LOCAL, service menu
null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active
(1)
(2)

FIG. 8E

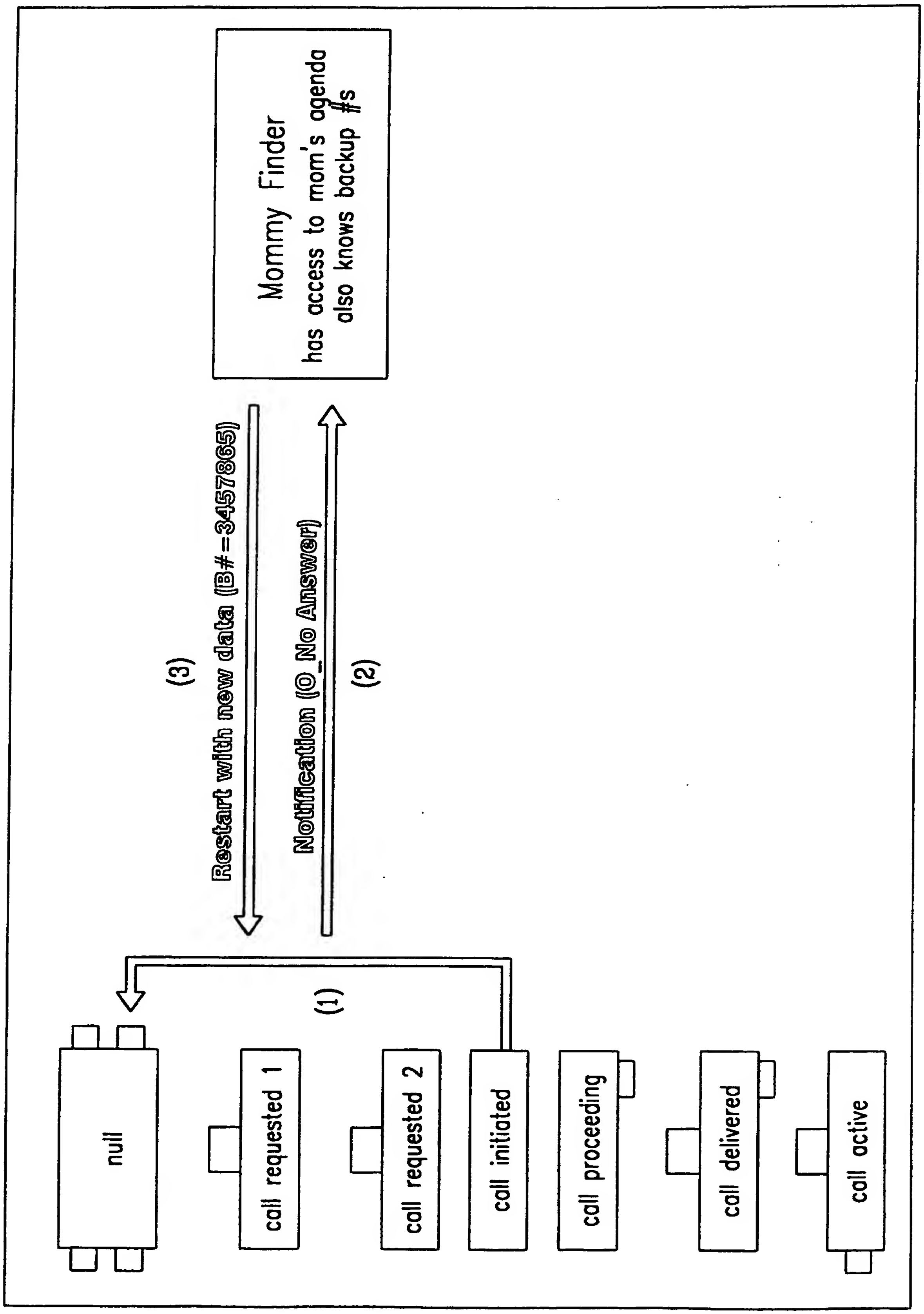

Mommy Finder
has access to mom's agenda
also knows backup #s
(3)
Restart with new data (B#=3457865)
Notification (O_No Answer)
(2)
(1)
null
call requested 1
call requested 2
call initiated
call proceeding
call delivered
call active

FIG. 8F

INTERNATIONAL SEARCH REPORT

International Application No
PCT/SE 99/02490

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M7/00 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 38018 A (KOPONEN HARRI ;KAAKKOLA MATTI (FI); MELEN BJOERN (FI); VAEAENAENEN) 28 November 1996 (1996-11-28) page 7, line 19 -page 9, line 21 page 13, line 26 - line 30 ---	1-30
P,X	EP 0 924 942 A (NORTHERN TELECOM LTD) 23 June 1999 (1999-06-23) column 3, line 7 -column 4, line 15 ---	1-36
P,X	RIZZETTO D ET AL: "A voice over IP Service Architecture for Integrated Communications" IEEE NETWORK, vol. 13 3, May 1999 (1999-05) - June 1999 (1999-06), pages 34-40, XP002900976 the whole document ---	1-6, 16-30

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 May 2000	20. 06. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Nabil Ayoub/cs

INTERNATIONAL SEARCH REPORT

International Ar ··lication No
PCT/SE 5ɔ/02490

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 16007 A (SAKSANEN PAULI ;FINLAND TELECOM OY (FI); KARHAPAEAE TUOMO (FI)) 1 May 1997 (1997-05-01) page 17, line 13 -page 18, line 19 ---	1,6,16, 23
A	WO 98 36542 A (TELIA AB PUBL ;KRAMPELL MAGNUS (SE); JOHANSSON MAGNUS (SE)) 20 August 1998 (1998-08-20) the whole document ---	1,6,16, 23
P,A	TAKEUCHI R ET AL: "Interfaces for Interworking among Intelligent Networks, Computer Telephony, and Voice over IP Systems" GLOBAL TELECOMMUNICATIONS CONFERENCE - GLOBECOM '99, vol. 3, 1999, pages 1916-1920, XP002900977 the whole document -----	1-6

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/SE 99/02490

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
WO 9638018	A	28-11-1996	FI	961690	A	25-11-1996
			AU	708519	B	05-08-1999
			AU	5916696	A	11-12-1996
			BR	9609190	A	11-05-1999
			CA	2221183	A	28-11-1996
			CN	1185268	A	17-06-1998
			EP	0829181	A	18-03-1998
			JP	11505973	T	25-05-1999
			NO	975343	A	21-01-1998
EP 0924942	A	23-06-1999	NONE			
WO 9716007	A	01-05-1997	AU	7302596	A	15-05-1997
			FI	955810	A	26-04-1997
WO 9836542	A	20-08-1998	SE	511796	C	29-11-1999
			SE	9700493	A	14-08-1998